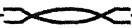


INDUSTRIAL OPPORTUNITY IN THE TENNESSEE VALLEY OF NORTHWESTERN ALABAMA



By HERMAN FREDERICK OTTE

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PREFACE

NORTHWESTERN ALABAMA has received much attention since 1880 as a potential industrial area. My interest in its industrial opportunities was first aroused while traveling in the area and adjacent regions in the summer of 1931. But the desire to study the area intimately was not realized until 1935. The field work was made pleasant and was greatly facilitated by the unfailing courtesy and the helpfulness of many individuals in the various communities and I take this occasion to acknowledge the aids they extended so freely.

I am under great obligation to Professors John E. Orchard, J. Russell Smith, and Douglas Johnson, whose writings and whose lectures and seminars at Columbia University greatly influenced me in the method of approach to the problem and whose comments on the manuscript were valuable. It was my privilege to present the study in outline form and to read certain sections of the manuscript before seminar groups under the direction of Professors Orchard and Smith and from the ensuing discussions I obtained numerous suggestions. Professors Thurman Van Metre and Henry S. Sharp, and Mr. Louis Hacker, all of Columbia University, also read the manuscript and offered helpful suggestions which are gratefully acknowledged.

HERMAN F. OTTE

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May 5, 1940

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Chapter I

INTRODUCTION



THIS is a study of industrial opportunity in that section of the Tennessee River Valley which lies to the west of the Cumberland Plateau in northwestern Alabama. The area includes Lauderdale, Limestone, Madison, Morgan, Lawrence, Colbert, and Franklin Counties. Throughout this study the area as outlined by these counties is known as the "Region" (Fig. 1, page 4).¹

THE PROBLEM

Several motives prompted study of the Region. The first and foremost purpose relates to the South as a whole. Individuals and groups have been giving increasing attention to the wealth of southern industrial resources and the inadequate utilization of those resources.² They emphasize the fact that industry should be expanded to utilize more fully the wealth of resources and thereby contribute a larger share to southern economy.³ But the picture of resources is generally presented with averages for large areas and therefore does not show where industry might be initiated or extended and what that industry might be. Such excel-

¹ Also see Figure 6, p. 111, which pictures the Region in its general setting.

² Odum, *Southern Regions of the United States*, Chapters IV and V; National Emergency Council, *Economic Conditions of the South*, pp. 7-8, 53-60.

³ *Ibid.*, pp. 7-8: "In spite of this wealth of population and natural resource, the South is poor in the machinery for converting this wealth to the uses of its people. With 28 percent of the Nation's population, it has only 16 percent of the tangible assets, including factories, machines, and the tools with which people make their living. . . . Despite its coal, oil, gas, and water power, the region uses only 15 percent of the Nation's factory horsepower. Its potentialities have been neglected and its opportunities unrealized."

lent general studies, Odum urges,⁴ must be supplemented by investigations which recognize southern diversity,⁵ and which tie facts and analyses to specific places and communities. This monograph seeks to make a small contribution to that goal through an examination of industrial opportunity in a section of northwestern Alabama.

The second consideration which induced this study relates to the program of the Tennessee Valley Authority. The Tennessee Valley Authority Act authorizes the Authority to "provide for the . . . industrial development of said valley."⁶ The Region comprises that part of the Tennessee Valley in which the development program of the Authority immediately came into play. Wilson Dam and the adjoining chemical plants were turned over to the Authority. The power facilities of the dam were placed in operation at once, and one of the chemical plants was soon converted into a phosphate rock processor. The Region is the first area upstream from the mouth of the Tennessee River with industrial centers located on the river. With the development of year-round navigation, these centers are in a position to profit from any advantages the inland waterway can confer. The Region, therefore, seemed to afford the best area for an evaluation of those forces unleashed by the Authority that are of significance to industry.

THE SETTING AND BOUNDARIES OF THE REGION

The Region's unity, viewed from the standpoint of industrial opportunity, will become apparent in the chapters that follow. At this point the general setting of the Region is indicated briefly and the bases for regional delimitation are noted.

⁴ Odum, *op. cit.*, pp. 445-47.

⁵ Geographically the South is an area of great diversity. Odum emphasizes this diversity repeatedly and writes that the South "differs . . . radically within its own borders. There is no longer 'the South' but many Souths." *Op. cit.*, p. 261.

In similar but more detailed vein Vance writes that "history, not geography, made the solid South, and to the extent that the area has forgotten its history and allowed the geography of region and resource to assert itself, to that extent the section has fashioned its cultural landscape along many and varied lines." *The Human Geography of the South*, p. 23.

⁶ *United States Statutes at Large*, XLVIII, 58.

The industrial core of the Region is confined to the lowlands which parallel the Tennessee River. On these lowlands are located the cities of Decatur, Florence, Sheffield, Tuscumbia, greater Huntsville, and Athens (Fig. 1). Population ranges from 4,200 for Athens (1930) to more than 15,500 for Decatur. Greater Huntsville, which includes Huntsville and suburbs, has between 20,000 and 25,000 inhabitants. The industrial establishments of the Region, with a few exceptions, are confined to these centers.

Away from the lowlands of the Tennessee River, toward the southern and eastern boundaries of the Region, the landscape becomes increasingly rugged. These margins of the Region and the areas that lie immediately beyond them are parts of the Cumberland Plateau. They were long isolated and until recently had little more than subsistence agriculture. They are almost totally devoid of industry and throw a wide barrier between the industrial centers of the Region and those to the south and east in the Warrior Coal Basin and the Great Valley respectively. The northern and western margins of the plateau, therefore, logically fix the southern and eastern boundaries of the Region.

The northern and western margins of the Region coincide approximately with the Alabama state line. On the western margin of the Region and in the northeastern corner of the state of Mississippi the resource pattern changes rapidly, as will be shown at a later point. To the north of the Region, throughout south-central Tennessee, the strong industrial pulse of Nashville is felt. Branch plants of organizations with headquarters in this city are found in many of the small centers. Nashville's influence is, of course, felt in the Region, but it is only of moderate significance and certainly has no more weight than that of Birmingham. A second distinction between the Region and the area to the north relates to the Tennessee River. The industrial centers of the Region are located on the river or at a distance of from ten to twelve miles from it; those of south-central Tennessee lie at an increasing distance from it. As the resource value of the Tennessee River comes more and more to the fore, this difference in location will become of increasing importance.

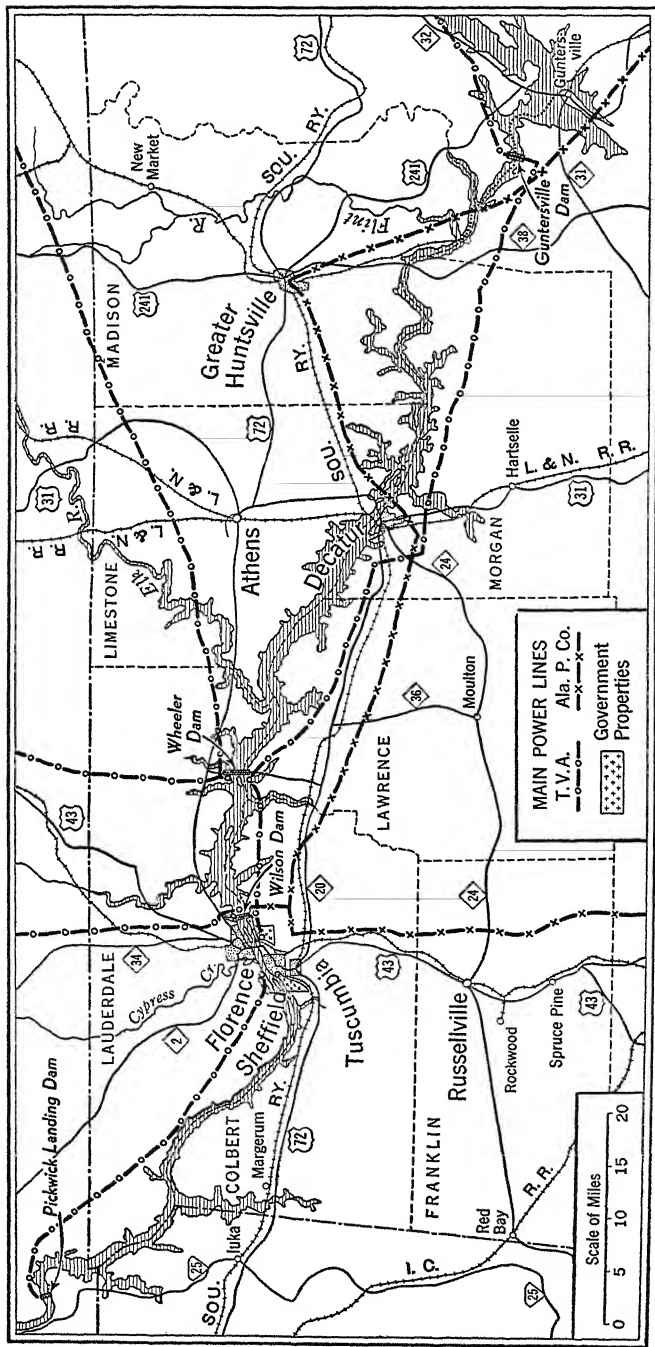


FIGURE 1

MAP OF THE SEVEN COUNTIES IN NORTHWESTERN ALABAMA COMPRISING THE REGION

Compiled from following maps: Tennessee Valley Authority, Engineering Service Division, *Tennessee Valley Region* (Knoxville, 1936); G. W. Jones and Sons, Engineers, *City of Huntsville* (Huntsville, Alabama, 1929); Alabama Power Company, *Northern Division of the Alabama Power Company* (Birmingham, Sept., 1939); Tennessee Valley Authority, Dept. of Operations, *Transmission and Distribution Systems* (Knoxville, Aug. 16, 1939).

The Region, then, has locational factors that differ from the factors bearing on industry in areas to the north, south, east, and west. Analysis of these locational factors, singly and in combination, and their relation to industrial opportunity will occupy the major part of this study.

THE METHOD

The approach to the study of industrial opportunity in the Region has been through field work. An overview survey in various areas of the South was first made. This reconnaissance consisted of brief visits to forty-six industrial centers. On the basis of the general survey, the Region was selected for special study. The field work in the Region and in its immediate vicinity was done during the summer of 1935 and during two weeks in the summer of 1936. The managers of thirty-one factories were interviewed. The plants visited included all the important industrial concerns then operating in the Region, with the exception of three cotton textile plants, one silk mill, and the phosphate rock processing plant of the Tennessee Valley Authority. Much information regarding the evolution of industry in the various communities was obtained from citizens, some of whom were able to recall and picture the changing industrial scene from the beginning of industrial promotions. Twenty-two prearranged interviews were held with individuals not directly connected with industry, in addition to a large number of unrecorded brief visits with people both within and immediately adjacent to the Region. Individual workers, lumbermen, plantation owners, farmers, county agents, librarians, chamber of commerce secretaries, railroad agents, and various other people contributed to a build up of the Region's industrial picture. Maps of land use for individual farms were made, and the Region's plant locations were plotted on available base maps. Raw-material sources within and adjacent to the Region were examined, to gain a visual impression of conditions. The field work was supplemented by library work in the library of the Alabama Department of Archives and History and in the libraries of New York City.

The results of the field and library studies are embodied in the

chapters that follow. The first of these chapters presents a brief description of the rise of industry in the Region and its changing structure. It serves as a foundation for the analysis of the present position of industry in the Region and its prospects for the future.

Chapter II

THE BACKGROUND OF INDUSTRY



THE REGION has had a long and checkered industrial career. During the period of industrial beginnings prior to the Civil War it was able to acquire several industrial establishments which were well known outside its own borders and which sold their wares in a wide market. But shop industry catering to local needs predominated. The war, however, brought total destruction, and its immediate aftermath permitted no recovery. In 1880 industry still stood at a lower level than in 1860. During the decade following 1880 there was inaugurated a period of industrial promotions which extended into the decade 1890-1900. Industry expanded rapidly, but by 1900 the boom enterprises had run their course. The period since 1900 has been one of industrial uncertainty, marked by shifts in types of industries and by short intervals of optimism. The Region's industrial past will be considered in the light of these four periods.

INDUSTRIAL BEGINNINGS, 1810-60

From the time of earliest settlement until 1860 the Region was dominated by agriculture. Development followed the pattern of utilization in other agriculturally favorable lands in Alabama and in the Deep South as a whole. Interest and effort were centered on the slave plantation economy, with cotton as the cash crop. In such a setting manufacturers found few attractions. The beginning which industry was able to make sprang largely from the Region's agricultural needs. Gristmills, crude sawmills, tan-

neries, and shops making agricultural implements were developed as adjuncts to plantations.

The attraction to agriculture, and in particular to cotton culture, was due to a number of causes. (1) It appeared to afford the most successful application of slave labor. (2) The favorable price of cotton over long periods brought wealth to those who cultivated it extensively.¹ (3) An abundance of land, with the illimitable West beckoning those who found the home environment too cramping, enabled young men to become plantation owners and allowed established planters to expand or move. Thus surplus capital was used to acquire more and more lands. (4) Another important factor was the social prestige and leadership that was accorded to plantation owners. Rural life overshadowed city life, and the planter was the model for ambitious boys.² Nothing that industry offered could match these attractions.

Planter control dominant from the time of earliest settlement. The lowlands adjoining the Tennessee River and the broad valleys between outliers of the plateau early attracted cotton planters from Georgia, the Carolinas, and Virginia. By 1810 the newly organized county of Madison was one of the leaders of the Mississippi Territory in both population and wealth.³ But the greatest surge of settlement began in 1818, when all lands west of Madison County on both sides of the Tennessee River were placed on the market. Men came from everywhere to participate, and land prices soared. Land which had been acquired at \$2 per acre in 1809 now sold for \$10 to \$20 an acre. The best of the rolling land sold up to \$50 an acre, while the sum of \$100 an acre was paid for rich bottom land in the vicinity of Tusculumbia.⁴ In this bidding for land the poor settler and the small farmer had no chance. They were therefore relegated to lands remote from the Tennessee River, while the accessible and rich lands were completely occupied by the large planters.⁵

¹ Moore, *History of Alabama*, pp. 271-73.

² Moore, *A History of Alabama and Her People*, I, 431.

³ Taylor, "Early History of Madison County and Incidentally of Northern Alabama: Madison of 1810," *Alabama Historical Quarterly*, I (Summer issue, 1930), 149-68.

⁴ *Ibid.*, "The Land Boom," I (Winter issue, 1930), 489-97.

⁵ Moore, *History of Alabama*, p. 88.

Though the planters were decidedly in the minority, their position enabled them to exert a dominating influence on the economy of the Region. With them it was an axiom that the cotton plantation system was economically sound. They believed with equal firmness that manufactures could not succeed in a plantation economy, and this belief was supported by the failure of a number of early enterprises.⁶ All effort, therefore, was directed toward the expansion of cotton culture under the slavery system.

To facilitate the marketing of cotton and to make possible the import of certain foods and essential manufactures, canals were projected and railroads were built. The chief barrier to easy movement of goods was the series of rapids in the Tennessee River immediately above the present site of Florence. As early as 1831 work was started on the construction of a lock canal designed to carry trade around the shoals. The same motive prompted planters, in 1832, to finance a railroad and to initiate its construction from Tuscumbia through Courtland to Decatur. The middle link in the canal, constructed around Big Muscle Shoals, was completed about 1840 but no funds were awarded for canals around Elk River Shoals and Little Muscle Shoals. Consequently boats still had to wait for a rise in the river in order to get through. Since no provision for the maintenance of the middle section had been made, it was abandoned and fell into ruins.⁷ The railroad linking the upper and lower Tennessee River did not prove a success until the 1850's, when it became a part of the larger service extending from Memphis through Chattanooga to Charleston. The cotton produced by planters above Florence, therefore, had to be handled by lighterage packets and cotton lightering became a regular business. From Florence steamboats of 3,000 to 4,000-bale capacity plied to New Orleans.⁸

The rapidity of settlement led to the early purchase of all lands suitable for cultivation. After several decades the older holdings began to suffer from soil impoverishment, until it became un-

⁶ Owen, *History of Alabama and Dictionary of Alabama Biography*, p. 411.

⁷ United States Congress, House of Reps., *Muscle Shoals Inquiry*, Hearing before the Committee on Military Affairs, 69th Cong., 2d Sess., on H. R. 16396 and H. R. 16614, Part III, pp. 11-12.

⁸ Boyd, *Alabama in the Fifties—A Social Study*, pp. 81, 89-90.

economic to cultivate them longer. But the lack of new productive land in the home community did not lead to industrialization. Ambitious young men who aspired to become plantation owners turned to the lands of the trans-Mississippi regions. During the 1850's the westward trek became popular enough to draw young and old alike.⁹ Cotton was truly king throughout the period from 1810 to 1860.

The beginnings of industry.—Flurries of sentiment for the establishment of manufactures ran through the Region from time to time. These were occasioned by brief but severe drops in the price of cotton, which momentarily disturbed the conviction that cotton was king; by tariff legislation which pushed upward the duties on imported manufactured articles;¹⁰ and by the desire to become independent of northern manufacturers who openly advocated abolition of slavery.¹¹ But none of these forces was prolonged enough to result in the rise of centers of industry.

The manufactures that came into being were predominantly small plants, those one, two, or three-man establishments processing leather, wood, and iron, and furnishing a portion of the local needs. The main function of such small shops was sometimes that of repair work, rather than the fabrication of new articles.¹² The predominance of small plants, even at the close of the period under consideration, is suggested by the large number of

⁹ Newspaper advertisements of lands for sale in the Region by individuals who were preparing to move westward were not unusual during the 1850's. The following quotation states tersely the westward trend of migration: "Valuable Plantation for Sale—having determined to remove to Texas—1,440 acres, 900 cleared. A. C. Jones." *Huntsville Democrat*, June 23, 1853, quoted in Boyd, *op. cit.*, p. 22.

¹⁰ Moore, *A History of Alabama and Her People*, p. 406.

¹¹ Boycotts of northern manufactured articles were advocated by many Southerners, especially during the 1850's. The plea for boycotts was usually coupled with an appeal for the development of southern industry. Steadman, urging the promotion of southern manufactures, remarked: "The time has arrived when every sense of duty, self-denial, and patriotism demands of us to supply ourselves with the necessities of life, which we possess the means of accomplishing at less cost and labor than any other people on earth. Why will we longer wait to be supplied by these northern fanatics? . . . It is not only the duty and interest of the southern people that they manufacture their cotton, but all other articles which it is possible for them to do—such as boots, shoes, hats, clothing, and the like—and to encourage the establishment of printing houses for the getting up of books, periodicals, newspapers, etc." *The Southern Manufacturer*, pp. 18-19.

¹² Moore, *History of Alabama*, p. 283.

establishments in relation to the number of workers in all except two types of industries (Table 1, page 13).

The establishments that produced goods beyond local needs faced the difficult task of marketing in a region where the population was scattered and where transport was poor. Moreover, the quality of their goods did not always meet the standards set by the elite of plantation society. Some of the large plants made bold and ambitious beginnings, but soon languished. Several operated successfully until the war brought about their destruction. Among these, cotton textile factories held first place.

Description of the large plants.—Perhaps the first cotton factory in Alabama, certainly one of the first, was located on the Flint River, in Madison County, about ten miles northeast of Huntsville. An advertisement in the *Alabama Republican* of September 29, 1820, shows that the factory was well established at that date, spinning yarn and distributing the product over several counties.¹³ About a decade later another cotton factory was erected just a short distance south of the confluence of the three forks of the Flint River. It was incorporated in 1832 as The Bell Factory of the County of Madison. Its capital stock was not to exceed \$100,000. By damming the Flint enough water power was obtained from overshot wheels to drive its 3,000 spindles and 100 looms for the manufacture of cotton cloth. Slave labor was used almost exclusively in its operation.¹⁴ For some years after its incorporation it was regarded as one of the two most important industrial enterprises in the state of Alabama.¹⁵

Cotton factories of much more than local importance were also erected on the banks of Cypress Creek, northwest of Florence, in Lauderdale County. The first of these mills was built prior to 1840.¹⁶ By 1850 three factories appear to have been in operation here.¹⁷ One of these, known as the Cypress Factory, worked up about 300 bales of cotton annually between 1850 and 1860.¹⁸

¹³ Betts, *Early History of Huntsville, Alabama: 1804-70*, p. 48.

¹⁴ Owen, *Annals of Alabama: 1819-1900*, p. 49.

¹⁵ Moore, *A History of Alabama and Her People*, p. 406.

¹⁶ "Early Industries in Lauderdale County."

¹⁷ Deland and Smith, *Northern Alabama*, p. 289.

¹⁸ Brewer, *Alabama: Her History, Resources, War Record, and Public Men*, p. 295. Robert Somers records that the three cotton factories had 23,000 spindles

The iron industry was also developed at an early date. The first blast furnace in Alabama was erected in the Region southwest of Russellville in 1818. The ore was secured from local brown ore deposits. Cedar charcoal was used for reduction purposes. The blast was supplied by bellows driven by water power. Forging was done by means of a 500-pound drop hammer, which was lifted into place by water power. This furnace operated intermittently from 1818 to 1832. During this period bar iron was supplied to iron workers in northern Alabama. Hollow ware and agricultural implements cast at the furnace were widely distributed to homesteads.¹⁹ Another furnace operated in Lauderdale County, near the Tennessee state line. The manufactured iron was taken to Florence by wagon and from that point shipped by boat to markets along the Tennessee River.²⁰

Other plants existed which turned out commodities in excess of local demand. The operations of a few of these were noteworthy enough to have been recorded by writers of the time. Such a plant was the vehicle factory of A. Hentz and Company, established sometime prior to 1851 in Huntsville.²¹ It advertised its coaches, charioteers, rockaways, phaetons, and buggies by a large drawing and seems to have supplied an extensive territory in northern Alabama.

Position of industry at close of period.—The Eighth Census of Manufactures presents a revealing picture of industry for 1860. This census does not appear to be complete,²² but it shows clearly that industry was on a small-shop and household basis, satisfying many local needs. The cotton textile industry, however,

and "supported a white population of 800 souls" during the years immediately preceding the Civil War. This information he gathered from residents of the area in 1870. *The Southern States since the War: 1870-1871*, pp. 136-38.

¹⁹ Armes, *The Story of Coal and Iron in Alabama*, pp. 27-31.

²⁰ *Ibid.*, p. 289.

²¹ Betts, *Early History of Huntsville*, p. 48.

²² For instance, only two cotton gins are recorded, both located in Limestone County. The many cotton gins associated with plantations appear not to have been listed. The two recorded gins may have been associated with some other business establishment located in one of the villages of the county or in the city of Athens. Likewise, blacksmithing, woodworking, implement manufacture, and so forth, were often a part of large plantations and may not have been always recorded.

was established on a factory basis, producing yarn and cloth with imported textile machinery. The manufacture of machinery may also have attained a degree of standardization and the beginnings of mass production (Table 1).

TABLE 1
THE REGION'S INDUSTRIES IN 1860*

| TYPES OF INDUSTRIES | NUMBER OF WORKERS | NUMBER OF ESTABLISH- MENTS |
|---|----------------------|----------------------------------|
| Cotton goods | 543 | 5 |
| Machinery and steam engines..... | 121 | 5 |
| Lumber, sawed | 101 | 22 |
| Boot and shoes | 59 | 21 |
| Leather | 59 | 22 |
| Blacksmithing | 52 | 21 |
| Woolen goods | 48 | 4 |
| Flour and meal | 45 | 26 |
| Carriages | 43 | 8 |
| Printing | 31 | 7 |
| Wagons and carts..... | 31 | 12 |
| Saddlery and harness | 25 | 8 |
| Tin, copper and sheet-iron ware | 22 | 4 |
| Clothing | 17 | 2 |
| Marble work | 16 | 2 |
| Sash, doors, and blinds | 12 | 1 |
| Furniture, cabinet | 10 | 5 |
| Agricultural implements | 9 | 5 |
| Bagging | 7 | 1 |
| Confectionery | 7 | 2 |
| Hats | 3 | 1 |
| Mattresses | 3 | 1 |
| Wool carding | 3 | 2 |
| Firearms | 2 | 2 |
| Iron castings | 1 | 1 |
| Watch repairing and silversmithing..... | 1 | 1 |

* Compiled from the United States Bureau of the Census, *Eighth Census of the United States: 1860*, Manufactures, pp. 5-7, 9.

A comparison of industry with agriculture indicates that manufactures held a very minor position in the Region in 1860. Capital invested in manufactures was equivalent to 5 percent of the cash

value of farms. The capital value rating of livestock on farms alone was threefold the capital invested in manufactures, though agriculture was not primarily concerned with livestock production. In the comparative number of people supported by agriculture and manufactures, a similar disparity is noted. Census data suggest that not more than 6 percent of the total population was in any way dependent on industry.²³

Some historians have concluded that the beginnings of a vigorous program of industrialization were being made during the latter part of the period under review. What the trend of manufactures might have been had no war intervened is a question affording much speculation. The facts of the period lead to the conclusion that the bulk of available capital and energy was always turned into agricultural channels. If suitable opportunities could not be found in the home community, they were sought in new lands lying to the West. Those few individuals who persisted in urging a greater degree of industrialization were unable to arouse sustained community interest.

INDUSTRIAL DESTRUCTION AND PARTIAL RECOVERY, 1861-80

The forces of war and war's aftermath prevailed during this period. Federal troops invaded the Region in the spring of 1862 and from that year until the close of the war it was at the mercy of foraging and plundering expeditions, which often destroyed by fire those things which could not be taken away.²⁴ During the war no fewer than ten raids of "devastation by invading armies" occurred. The raiding parties usually proceeded through the entire east-west length of the lowlands adjoining the

²³ The total population in 1860 was 103,114. Of this number 1,320 were wage earners in industry. If each of these workers supported on an average a family of five persons, a total of 6,600 persons, or 6 percent of the total population, were dependent upon manufacturing for a livelihood. But this calculation is probably much too generous for a period in which practically all able-bodied persons participated in the production of material wealth.

The various comparisons of industry and agriculture as given above were calculated from the *Eighth Census of the United States: 1860*. Population, p. 8; Agriculture, pp. 2-3; Manufactures, pp. 5-7, 9.

²⁴ Fleming, *Civil War and Reconstruction in Alabama*, pp. 62-68.

Tennessee River (Fig. 2). The intensity and thoroughness of destruction was aggravated by the absence of Confederate forces of army size. The small detachments who opposed the Union invaders were therefore regarded as guerrillas, and the community was held responsible for all guerrilla attacks. For such attacks punishment was meted out by destroying property. Much damage was also done by small bands of deserters and Union sympathizers and by roving gangs of outlaws which flourished toward the close of the war.²⁵ Factories were sought out for demolition

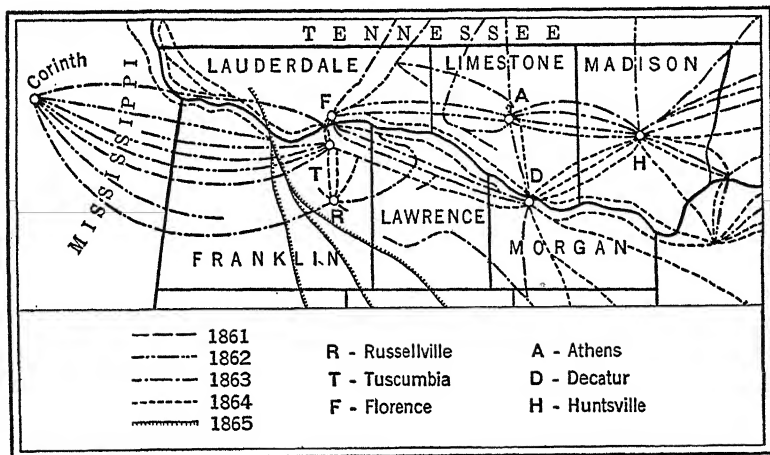


FIGURE 2

RAID ROUTES OF UNION ARMIES DURING THE CIVIL WAR

Adapted from Fleming, *Civil War and Reconstruction in Alabama*, p. 256, by permission of Columbia University Press.

as eagerly as bases of supply where war materials lay accumulated. The cotton mills of Madison and Lauderdale Counties were burned as early as 1862.²⁶ Many of the smaller shops were completely destroyed in subsequent raids.

Prostrate condition of Region at close of war.—By 1865 little material wealth was left in the Region. Factories and plantations

²⁵ *Ibid.*, pp. 119-21.

²⁶ *Ibid.*, p. 158.

had been destroyed and villages had been sacked. A picture of the devastated Region is presented by Robert Somers, who wrote as follows in 1870:

It consists for the most part of plantations in a state of semi-ruin, and plantations of which the ruin is for the present total and complete. . . . The trail of war is visible throughout the valley in burnt-up gin-houses, ruined bridges, mills and factories, of which latter the gable walls only are left standing, and in large tracts of once cultivated land stripped of every vestige of fencing. The roads, long neglected, are in disorder, and having in many places become impassable, new tracks have been made through the woods and fields without much respect to boundaries. Borne down by losses, debts, and accumulating taxes, many who were once the richest among their fellows have disappeared from the scene, and few have yet risen to take their places.²⁷

The inhabitants of the Region, broken in spirit and without material wealth, had to begin the task of rebuilding by providing shelter and by producing essential foods. Manufactures had to go back to the household stage. Capital had to be accumulated before larger enterprises could be undertaken. The task of reconstruction required decades.

Partial recovery of industry after the war.—Only a few of the factories destroyed during the war had been reestablished by 1880. The Bell Factory of Madison County was rebuilt sometime prior to 1872. In that year it employed 100 persons and required about 600 bales of cotton.²⁸ In Lauderdale County only one mill had been rebuilt by 1870.²⁹ Its 3,000 spindles and 75 looms worked up about 1,000 bales of cotton annually and furnished employment for 100 persons.³⁰

The industries which recovered most rapidly were engaged primarily in the processing of materials for local consumption. Among the groups of manufactures summarized for the year 1880, "flouring and grist-mill products" ranked first, both from the standpoint of number of establishments and the amount of capital invested.³¹

²⁷ Somers, *The Southern States since the War*, pp. 114-15.

²⁸ Brewer, *Alabama*, p. 348.

²⁹ Somers, *op. cit.*, pp. 136-38.

³⁰ Brewer, *op. cit.*, p. 295.

³¹ *Tenth Census of the United States: 1880. Manufactures*, pp. 193-94.

At the close of this period industry as a whole lagged far behind the position it held in 1860. Total wage earners equaled one-third the number of the earlier year, and the value added by

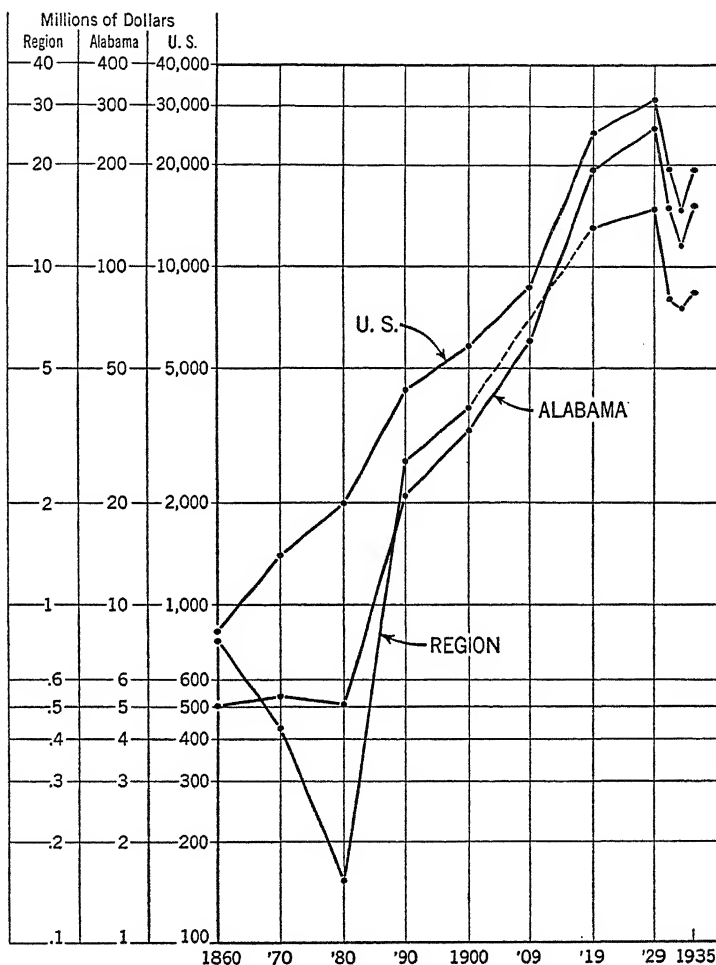


FIGURE 3

RATE OF CHANGE BY DECADE IN VALUE ADDED BY MANUFACTURES

The rate of growth in the region has been slower than in Alabama and the nation as a whole. Compiled from the United States Bureau of the Census, Censuses of Manufactures for the years indicated.

manufactures was one-fifth the value added in 1860. From this low position industry was to be lifted by the boom enterprises of the next decade (Fig. 3).

INDUSTRIAL PROMOTIONS, 1881-1900

The events of this period led to the rise of the centers of industry recognized in the Region today. The urge to develop centers of industry found expression through promotion companies, which initiated the building of villages and cities and which gave wide publicity to the "industrial potentialities" of the Region. Capital for investment was thereby attracted and industrialists were induced to locate their factories in the new centers.

The forces which caused manufacturing centers to spring into being in an area long devoted almost entirely to agriculture and its attendant trade naturally had their roots in the conditions of the times. They were forces operating on a south-wide and even a nation-wide scale. The experiences of the Region were therefore typical of those in many other localities, as will be shown later.

The fundamental influence affecting the South as a whole was the Civil War, which compelled great changes in the domestic economy. During that period of isolation, the South was forced to manufacture many things formerly purchased abroad or from the North. Weapons and clothing had to be provided for the armies. Transport equipment had to be built. A large number of these newly organized industries were destroyed during the last two years of the war. But during the time of their operation they had revealed to the South possibilities ignored in the past. The experience gained in that fashion induced the reestablishment of many industries as soon as capital became available after 1865.³²

The war compelled a great movement of men, who thereby gained a wider outlook and broader concept of the nation's potential wealth. As soldiers they were brought into contact with a variety of mineral resources, manufacturing enterprises, and

³² Armes, *The Story of Coal and Iron in Alabama*, pp. 157-94.

agricultural areas. Careful observation and opportunity for comparison enabled them to see potentialities which had previously been overlooked. Areas which appeared to be favorable for development of industries were often noted. After the close of hostilities these were sought out for development as soon as conditions permitted.

The war had disrupted the slave plantation economy. The freed Negro was shiftless and unreliable. Owners of vast acreages found it impossible to coördinate the cultivation of their scattered holdings. Large plantations were a drug on the market. They no longer lured the majority of ambitious men and a large part of surplus capital.³³ Southern leaders, anxious to rebuild the South, turned their energies into new channels. Through writings and by example they urged that industry be developed, and gradually the rank and file came to visualize the need for an industrial revolution.³⁴

Another general influence—and unquestionably the most important immediate factor behind the promotion enterprises started in the Region—was the infectious boom spirit abroad in the land after the panic of 1873 had subsided. It was an era of westward expansion and southward penetration by northern capitalists. Everywhere far-reaching schemes for economic expansion were talked about and frequently undertaken. The prevailing state of mind tended to minimize obstacles and to exaggerate all favorable factors. The possibilities of future developments seemed limitless. Hence groups of men, organized as companies, made systematic searches for areas and sites which might lend themselves to a burst of economic expansion. One such area selected for industrial promotion embraced the valley areas of northwestern Alabama.

³³ Somers, *The Southern States since the War*, pp. 115, 118-83.

³⁴ This thought is fully developed by Broadus Mitchell. That the South as a whole underwent a change in attitude and consciously strove to develop industry, is stated by him in the following summary manner: "This whole study goes to show a fundamental distinction between the English Industrial Revolution and that in the South, namely, that the former was, certainly in its immediate causes unanticipated, accidental, while the latter was deliberately planned." *The Rise of Cotton Mills in the South*, p. 79.

The Region first fell under the spell of promotion magicians during the decade 1880-90. The immediate influence of particular importance was the success of development schemes in other areas. The logic involved was simple. Other areas and centers had made startling progress. Promotion of industrial centers in this Region of "unmatched advantages" was bound to be equally successful.³⁵ After the first promotion enterprise in the Region had carried through a spectacular land sale and had secured a number of large industrial establishments, it served as a model for others.

*The Sheffield Land, Iron, and Coal Company.*³⁶—The first attempt to promote the Region as an industrial area was made in 1883 by the Sheffield Land, Iron, and Coal Company. Alfred H. Moses, a member of a large realty firm and a lawyer from Montgomery, Alabama, was its guiding spirit. In 1883 he passed through Florence, Alabama, where he examined real estate for investment purposes. While there he was persuaded to visit the iron ore deposits of Franklin County. The tour of inspection of the mineral lands carried him over the site of the present city of Sheffield. The gently rolling lands across the Tennessee River from Florence impressed him as an ideal location for a great iron industry. Out of this three-day excursion grew negotiations which resulted in the purchase of almost 3,000 acres of land as a site for the projected city of Sheffield, and 30,000 acres of mineral lands in the counties immediately to the south.

Following these purchases, the Sheffield Land, Iron, and Coal Company was organized and engaged in extensive advertising

³⁵ The influence of successful promotion enterprises on the initiation of similar developments in the Region is indicated frequently in records of the period. An observer at the Sheffield sale of factory sites and town lots reports that fact as follows: "It was evident to the mind of an observer that the remarkable progress of Birmingham, Roanoke, Atlanta, Anniston, and some other towns of less importance would become an important factor in the success of the sale." *Iron Age*, XXXVI (June 26, 1884), 1.

Deland and Smith record that "the attention of various business men throughout the South, especially in the states of Georgia and Alabama, had already been thoroughly aroused by the wonderful history of Birmingham and had been for some time directed to the Tennessee Valley. It was not a difficult task to make Sheffield the special object of their inquiries." *Northern Alabama*, p. 409.

³⁶ Deland and Smith (*op. cit.*) were the source for materials used in the accounts of the first three promotion companies unless otherwise indicated.

which proclaimed what had been done and what might be expected from developments soon to follow.³⁷ By May, 1884, sufficient progress had been made to justify the first sale of lots. Enthusiasm was at a high pitch, and bidding was brisk.³⁸ Lots and industrial sites were speedily disposed of, until a total of 75 acres, with a bid price of \$350,000, had been taken up.

Within a week after the closing date of the sale, a reactionary movement set in. The downward plunge probably got its initial impulse from a national money panic, marked by the failure of a number of large banks. No industrial plants of any kind had been erected and, with confidence shaken, companies refused to fulfill agreements to build smelters and furnaces. The real value of lots, therefore, appeared to be no more than the cotton lands from which they had been carved. Liquidation and forfeiture were now the order of the day.

By 1886 confidence was restored, and the establishment of an iron city was begun. Blast furnaces were erected. Transportation equipment for the assemblage of raw materials was provided. Machine works and woodworking plants were attracted. By 1890 four iron furnaces had been blown in, with a total annual capacity of 140,000 tons, and another stack was under construction.³⁹ Other principal industries of the early 1890's included two machine factories, two woodworking factories, one flour mill, one harness factory, and railroad shops. The entire development program had been carried out, at an estimated cost of \$5,000,000.⁴⁰

The Florence Land, Mining, and Manufacturing Company.—It did not take long for the citizens of Florence to gain inspira-

³⁷ One pamphlet issued to acquaint people with the merits of the new development was entitled: *Points of Information in Reference to the Establishment of a Great Manufacturing City at Sheffield, Alabama.*

³⁸ *Iron Age*, XXXVI (May 15, 1884), 29: "Five thousand people were present at the bidding for lots. The stock of the corporation has gone up 500 per cent. The principal investors are from New York, Philadelphia, Atlanta, Chicago, Mobile, New Orleans, and St. Louis."

³⁹ *Directory of the Iron and Steel Works of the United States*, 10th ed. (1890), pp. 44-45. Prepared and published by the American Iron and Steel Association, Philadelphia, from 1873 to 1912. Since then the *Directory* has been prepared and published by the American Iron and Steel Institute, New York. In this study all subsequent references to the *Directory* will be identified by title only.

⁴⁰ Berney, *Handbook of Alabama: 1892* (2d ed., rev.), p. 372.

tion from the events taking place immediately beyond the limestone bluffs to the south of the Tennessee River. The spectacle of cotton fields being converted overnight into high-priced lots stirred the people to action. Out of the agitation grew the Florence Land, Mining, and Manufacturing Company, organized in 1886, to give the city its second promoter's boom.

For Florence dated back to 1818, the year of the cotton-land boom. The powerful Cypress Land Company of that date, composed of a "numerous association of respectable, opulent, and enterprising individuals,"⁴¹ had established a cotton emporium for the vast plantations. The particular site of Florence had been selected because of its position at the head of navigation. A great future had been planned for the city, and the bright prospects visioned by its promoters had been pictured.⁴² As a consequence, a number of half-acre lots had been sold for more than \$3,000 each and the total sale had aggregated around \$220,000.⁴³ In the pre-Civil War period Florence had developed as a "center of learning, refinement, and prosperous trade."⁴⁴ But the ravages of war had left it in a pauper state, from which the second promoter's boom was to rouse it.

The Florence Land, Mining, and Manufacturing Company that initiated the industrial promotion of Florence in 1886 was headed by local people. As a basis for its organization, it secured valuable town property, tracts of mineral lands, and about \$300,000 in cash subscriptions. Its first act was to give wide publicity to the rejuvenation of the city. Special inducements were held out to industries. The promotion company gave its aid by participating in the establishment of industrial plants, and its directors served as active members of those corporations.

⁴¹ Moore, *History of Alabama*, p. 82, quoting from a source not cited.

⁴² "Intelligent men, from all quarters possessing any tolerable knowledge of the Tennessee River, and that tract of country commonly called the Big Bend, have long foreseen that, at the lower end of the Muscle Shoals, there *must*, in the natural course of things, spring up one of the largest commercial towns in the interior of the South-western section of the Union." *Historical Official Souvenir of Florence, Alabama* (Centennial Celebration, 1818-1918), p. 2, quoting a Cypress Land Company report.

⁴³ *Ibid.*, p. 1.

⁴⁴ Somers: *The Southern States since the War*, p. 134.

By 1890 the city had an iron industry consisting of two blast furnaces with an annual capacity of 80,000 net tons.⁴⁵ Other industries of more than local importance comprised one stove factory, an iron-railing and fence factory, a pump factory, a wagon factory, one cotton textile factory, a bucket factory, and several woodenware works. The entire development program had cost above \$2,000,000.⁴⁶

The Decatur Land Improvement and Furnace Company.—The Decatur Land Improvement and Furnace Company had as its objective the development of a "Chicago of the South" on lands in and surrounding the then moribund village of Decatur, Alabama.

Decatur had been founded in 1820 as a necessary Tennessee River port. Its site marked the head of Muscle Shoals and therefore the downstream limit of navigation on the upper Tennessee River. During the period prior to the Civil War it had become an assembling and transfer point, for here the lighterage packets and the river steamers met. It had been a strategic point during the war, alternately occupied by forces of both armies. The immediate post-war period had brought a slow revival in trade and shipping. In 1872 it had become the intersection of two important railroads, but the village continued dormant and in 1880 had a population of only 300. But it was destined to undergo rapid changes during the following decade.

In 1886 Major E. C. Gordon, who had been one of the leaders of the Sheffield enterprise, took active steps to bring about the industrial development of Decatur. He thought that a large city would grow up in northern Alabama and promptly set out to make Decatur and vicinity its locus. He and his associates initiated that undertaking with the usual purchase of lands—5,600 acres in and adjacent to Decatur and 50,000 acres of mineral lands in northern Alabama. These lands were then sold to the newly organized company named above. It was the wish of the company to make Decatur a center of diversified industry. Much

⁴⁵ *Directory of the Iron and Steel Works of the United States*, 10th ed. (1890), pp. 144-45.

⁴⁶ Berney, *Handbook of Alabama*: 1892, p. 359.

publicity was therefore issued through pamphlets, circulars, and newspapers, which amplified the merits of the place.

Industries were attracted and their plants were put up with boom speed. By 1888 these included one charcoal iron furnace with an estimated annual capacity of 18,000 net tons,⁴⁷ one charcoal chemical factory, a railroad car factory, a car-wheel factory, the Louisville and Nashville shops, one structural iron factory, one steam-engine and ironware factory, an iron wheelbarrow factory, two clay-brick works, one tannin extract factory, and three wood-planing mills for the manufacture of doors, blinds, and window frames. The enumerated plants, excluding the railroad car factory, had an employment capacity of 1,700 wage earners.

The population growth of all these boom enterprises was of a hothouse order. Decatur may be regarded as typical of such growth. The number of inhabitants increased from 1,000 to 7,000 in a single year. A collection of biographies reveals that 25 per cent of the prominent men listed in 1888 had come into the city within the preceding two years. The recent arrivals were largely engaged as real estate dealers and as managers of the rising industries. But the leading men in the enterprise were individuals who had resided in the community for many years.

The North Alabama Land and Improvement Company.—The North Alabama Land and Improvement Company promoted Huntsville's early industrial growth. This organization at first concerned itself with the development of Huntsville as a resort center and with the publicizing of Madison County as an area of great agricultural opportunities. Such a program was in keeping with Huntsville's past, for it had been a city of planter wealth and southern refinement almost from the year of its founding. Even as early as 1819, it had been reported as "a most flourishing town, in the midst of one of the finest countries on earth," and had afforded "a polished and hospitable society."⁴⁸

By 1890 the major function of the Improvement Company was that of attracting manufactures. The company was largely

⁴⁷ *Directory of the Iron and Steel Works of the United States*, 10th ed. (1890), p. 47.

⁴⁸ Cummins, *A Summary Geography of Alabama*, pp. 19-20.

sponsored by prominent Huntsvillians, who thought of making their city a place "of humming business, of great commerce, of better schools, and of plenty for their townsmen."⁴⁹

As industries were attracted during the years following 1890, it became evident that cotton textiles were to dominate. The first large factory was given land for its site and was granted free water for a period of ten years.⁵⁰ Special inducements drew other mills, and by 1900 Huntsville and vicinity could claim a cotton textile industry of 91,000 spindles with 1,900 wage earners.⁵¹ Other manufactures comprised two small foundries, one spoke-and-handle factory, a canning factory, one furniture factory, and several flour mills.⁵²

Summary of promotion enterprises.—For the Region as a whole the boom enterprises brought about a rapid growth of manufactures over a short period of time. A tenfold increase in the number of workers employed took place from 1880 to 1890, with a fifteenfold increase in the value added to manufactures. Those who participated in this growth were confident that it was only the beginning of a period of great industrial expansion.

The promotion companies had given wide publicity to two factors which, they maintained, would inevitably give the Region industrial advantage over other areas. These factors were: (1) favorable location with respect to markets and to raw materials, particularly for the iron industry; and (2) an inexhaustible supply of these accessible raw materials. These factors were emphasized in particular by the promotion concerns developing centers of industry adjacent to the Tennessee River.⁵³

⁴⁹ Chapman, "Huntsville Life in the Gay Nineties," *Huntsville Times*, July 8, 1934.

⁵⁰ *Ibid.*

⁵¹ *The Blue Book Textile Directory of the United States and Canada*, 1900-01.

⁵² Chapman, *op. cit.*, *Huntsville Times*, July 22, 1934.

⁵³ Examples of the publicity issued concerning the favorable location follow:

"A glance at a map will show that Florence is the center of a circle of which Birmingham, Memphis, Nashville, and Chattanooga, standing at an average distance of 125 miles, are points on the circumference. The Tennessee River might be called the diameter of this circle; and complete lines of railroad, running from each of these points form its radii. Within this circle on the north, is to be found the brown hematite ore of Tennessee, and on the south and east are the deposits of coal practically inexhaustible....The trade of this region must have a center;

The optimism regarding the Region's favorable location and abundant raw-material supply did not rest on any careful analysis of those factors. This becomes apparent as the period is viewed in retrospect.

The cities at the lower end of Muscle Shoals pictured the Tennessee River crowded with boats, bearing their products to all ports reached by the inland waterway system. This enthusiasm was, perhaps, based on past experience. It was noted at an earlier point that the Tennessee River had functioned in an important way as the highway to the Region's cotton markets. Moreover, as the iron furnaces came into operation, a number of shipments of pig iron were made by river down the Tennessee and up the Ohio as far as Pittsburgh.⁵⁴ But neither the Tennessee River nor the Ohio River afforded year-round navigation. The Tennessee was subject to low water seasonally. During the winter season the Ohio was closed by ice for periods of varying length. Moreover, for two decades railway development had proceeded at such a pace that waterway development had come to a standstill and river navigation had declined.⁵⁵ It must have been

there must be a distributing point, and that point must have transportation facilities. Florence replies to the demand with the Tennessee River and three completed lines of railroad." Deland and Smith, *Northern Alabama*, p. 291.

"Here is the river upon which the pig iron of the world can be sent to market, and reaching, through its tributaries, every city in the valley of the Mississippi, the Missouri, the Ohio, and away down to the Gulf, and thence to the ocean. In two years you will see the Tennessee alive with Sheffield's shipping, and there will not be a river in the great Mississippi valley which will not be coursed by Sheffield pilots." *Ibid.*, p. 413.

Similar glowing pictures of the raw-material situation were presented. The following are typical:

"Eighteen miles north of Florence is the southern limit of the 'western iron belt of Tennessee,' covering over 5,000 square miles, and containing inexhaustible deposits of limonites or brown hematite ore. In places, the beds are 75 feet in thickness and the ore is mined with steam shovels. The ores are rich and can be worked very cheaply. The iron is a high silicon iron, similar to Scotch pig." Berney, *Handbook of Alabama: 1892*, p. 359.

One of the leaders in the promotion enterprises and for years state geologist of Tennessee is reported to have said that he had seen, near one of the rising centers, "in a straight line distance of twelve miles and a width of two miles . . . ore enough to supply the probable demands of the United States for half a century if no other could be found within its limits." *Iron Age*, XXXVI (June 26, 1884), 1.

⁵⁴ *Iron Age*, XLV (March 6, 1890), 382.

⁵⁵ The South experienced a 70-percent railroad mileage increase between 1880 and 1890. Holmes, *Plant Location*, p. 47.

evident at the time that river vessels were being rapidly superseded by railways as carriers of inland commerce.

From the standpoint of rail transportation, the promoters were constantly tempted to place the Region at the center of things. Actually, it was at that time off the traveled routes and in the shadow of greater traffic centers on every side. It suffered, also, from rate disadvantages from several directions.

The southern rate structure developed along lines known as the Southern Basing Point System. This system involved the violation of the distance principle of rate making to a very great extent. Under it certain cities were charged comparatively low rates. The lower-rate cities were frequently either upon water routes, where competition flourished, or in locations which had become great rail centers, served by many competing lines. Meanwhile other towns, where competition was lacking, were required to pay high rates, usually a combination of the rate to the nearest basing point plus the local rate to destination.⁵⁶

Fortunately for the Region, its cities were made basing points and enjoyed rates equal to those applying at Birmingham, Chattanooga, and a number of other important centers, on business originating in, or destined to eastern seaboard cities moving via the Southern Railway through Chattanooga.⁵⁷

To the north, however, the irregularities of the Basing Point System placed the Region at a disadvantage. This arose from the rate situation at Nashville, and combinations made on Nashville rates. Nashville had low class rates to the north via Cincinnati. South of Nashville higher rates applied. Hence the Region's rates on goods originating in or destined to centers north of the Ohio were a combination of the high rate south from Nashville and the lower rate north from that city.⁵⁸

Class rates did not favor Birmingham over the Region in commerce with the North Central States. In 1894, for instance, the

⁵⁶ Eliot Jones, *Principles of Railway Transportation*, pp. 157-58.

⁵⁷ "By the lines from New York and other eastern seaboard cities through Chattanooga, Huntsville is a longer distance point than Chattanooga by 97 miles, Decatur by 122 miles, Tusculmbia by 165 miles, Sheffield by 170 miles, and Florence by 173 miles, but the rates to all these points are the same as the rates for the shorter haul to Chattanooga." Ripley, *Railway Problems* (rev. ed.), p. 271.

⁵⁸ *Ibid.*, pp. 269-72.

first class rate between Chicago and Birmingham was 119 cents per 100 pounds, whereas the rate to centers of industry in the Region was 110 cents.⁵⁹ It appears, however, that Birmingham was greatly favored in rates on iron to Pittsburgh and other points along the Ohio River and beyond.⁶⁰ Birmingham shipped iron under a low commodity rate, but the Region did not have the necessary volume of output to command a similar rate.⁶¹ Since several of the promotion enterprises had placed chief emphasis on the iron industry, such discrimination was of the greatest significance.

That the picture of mineral raw materials, as painted by the promoters, was greatly overdrawn is explained fully at a later point. Several factors, well understood today, however, may not have been so evident at the time and may have contributed to the exaggerated claims. The iron industry had not yet concentrated its activities in a few major centers. Iron furnaces were still scattered throughout the ore areas of the South, and it may be that some thoughtful observers felt that the Region was well situated to share in this output of pig iron and steel. But brown ore deposits, on which the region had to depend, were recognized even at that time as unreliable for large-scale operations.⁶² To maintain, therefore, that the expanding centers along the Tennessee River were to become the greatest producers in the nation's iron and steel industry was either due to a grand delusion or to the promoters' desires to catch unwary investors.

⁵⁹ *Ibid.*, pp. 161, 162, 174, 293.

⁶⁰ Holmes, *Plant Location*, p. 47.

⁶¹ It appears that the Louisville and Nashville Railroad deliberately fostered the iron industry at Birmingham and gave it many advantages not accorded the Region. President M. H. Smith of the Louisville and Nashville is reported to have said "that the Louisville & Nashville had too much invested to sit still and watch that failure [of the Birmingham Rolling Mills]; that the Tennessee Coal, Iron & Railroad Company owed it to itself and to the district to go into the manufacture, and that if it refused to do so, the Louisville and Nashville would contribute towards the enlargement of the plant at the Birmingham Rolling Mills." *Yearbook of the American Iron and Steel Institute*: 1914, p. 485.

⁶² An observer reporting on developments in the Region's rising centers of industry records the enthusiastic picture of mineral raw materials as it had been presented to him and then proceeds to state his doubts in the following terms: "The most experienced furnace-men in the United States have told me that it was not safe to build 100-ton furnaces in areas depending on brown ores." *Iron Age*, XXXVI (June 26, 1884), 1.

It is pertinent also to remember that the times required no close analysis of the industrial conditions and prospects of areas before development schemes could attract capital to them. The enterprises were often games of chance in which entire communities were the pawns. Chance, coupled with the fact that it was an era of rapid expansion in a continent of unparalleled resources, often led to a fortunate outcome. Schemes that appeared to be without foundation often gave rise to industrial centers of great magnitude. Others, prompted by the same infectious boom spirit and by the success of promotion enterprises elsewhere, lacked the basic qualifications for their own maintenance and failed or were compelled to make painful readjustments. Unfortunately, several centers within the Region had to face the latter situation. Their industries had to undergo drastic reorientation.

INDUSTRIAL UNCERTAINTY, 1900-33

The keynote of this period was industrial uncertainty. This uncertainty was due: (1) to the inability of the iron and subsidiary industries to function successfully in the Region; and (2) to the uncertain program of Tennessee River development and utilization for power and navigation, as exemplified by the Wilson Dam project.

Necessary readjustments of industries.—The centers which had placed faith in the rise of a great iron industry had difficulty in maintaining furnaces in operation. Eight iron furnaces had been built, with an initial rated annual capacity of 296,000 net tons.⁶³ Those furnaces were rebuilt and remodeled from time to time. From the very beginning, however, output was halting. Changes in ownership were frequent. Operating companies passed into receivership. Others, by reorganization proceedings, were temporarily revived with new issues of bonds and stocks. A life history of one of the furnaces illustrates the desultory operations of the iron industry in the Region and gives point to the claim that industries which used the pig iron locally came and went.

⁶³ Five of those furnaces were located in Sheffield, two in Florence, and one in Decatur. *Directory of the Iron and Steel Works of the United States*, 10th ed. (1890), pp. 44-45, 47; 11th ed. (1892), p. 45.

The North Alabama Furnace, Foundry, and Land Company, of Florence, Alabama, had an iron-producing unit built in 1888 at Florence. The unit comprised one stack, with three improved Pollock stoves, and had an annual rated capacity of 30,000 net tons. The stack was blown in in October, 1889, and used Tennessee brown hematite ore. James S. Lawton was president; J. H. Field, general manager; Wade Allen, secretary and treasurer; and A. J. McGarry, superintendent, all listed as of Florence.

In 1892 W. O. Shelton, of Florence, was assignee, and in February, 1892, the unit was reported as having been idle since July, 1890, and for sale. By 1894 the Spathite Iron Company, with its main office in Nashville, Tennessee, was reported as the owner. The unit had been rebuilt in 1893 and was known as the Spathite Furnace. Brown hematite ores from Iron City, Tennessee, were used with coke from Pineville, Kentucky, as fuel. Thomas Sharp was president and H. W. Buttoroff secretary and treasurer, both of Nashville. The selling agents were George H. Hull and Company of Louisville, and Lee Chamberlain and Company of Columbus, Ohio.

In 1896 J. Overton Ewin was the receiver, and in 1898 the unit was owned by the Columbia Finance and Trust Company, of Louisville, assignee of the Kentucky Trust Company of Louisville. It was reported as having been idle since 1895, and was once more for sale in April, 1898. The end of the unit was indicated in 1901 by the terse notice: "Dismantled."⁶⁴

Other iron-producing units had a longer existence, but all followed the pattern of frequent changes in ownership and of long periods of idleness exemplified by the unit described in the foregoing paragraphs. A view of the industry as a whole, in terms of output capacity (Table 2), suggests that it attained its maximum development soon after 1900. The data in Table 2 present a somewhat false picture, inasmuch as they do not show the long periods of idleness of most of the furnaces. Neither do they show the period of maximum production, for the capacity of furnaces was reported long after they ceased to produce. The last vestiges of an

⁶⁴ Compiled from *Directory of the Iron and Steel Works of the United States*, eds. 10-15.

TABLE 2

RATED OUTPUT CAPACITY OF THE REGION'S IRON INDUSTRY
FOR GIVEN YEARS *

| YEAR | RATED OUTPUT CAPACITY IN NET TONS |
|------------|---|
| 1890 | 228,000 |
| 1892 | 296,000 |
| 1894 | 296,000 |
| 1896 | 380,000 |
| 1898 | 449,000 |
| 1901 | 478,000 |
| 1904 | 478,000 |
| 1908 | 478,000 |
| 1916 | 410,000 |
| 1920 | 358,000 |
| 1926 | 260,000 |
| 1930 | none |

* Calculated from *Directory of the Iron and Steel Works of the United States*, eds. 10-21.

active iron industry disappeared from the Region with the dismantling in 1929 of the two remaining furnaces in Sheffield.

On the other hand, cotton textiles, which had expanded rapidly in Huntsville and vicinity during the period of industrial promotions, continued to grow in that center and gradually spread to other cities in the Region. One measure which suggests this growth and spread is presented in Table 3. Great efforts were be-

TABLE 3

TOTAL SPINDLES OF THE REGION'S COTTON TEXTILE INDUSTRY
FOR GIVEN YEARS *

| YEAR | HUNTS- VILLE | FLORENCE | ATHENS | DECATUR | RUSSELL- VILLE | TOTAL |
|------|-----------------|----------|--------|---------|-------------------|---------|
| 1895 | 40,348 | 11,000 | | | | 51,348 |
| 1900 | 91,048 | 14,720 | | | | 105,768 |
| 1905 | 208,176 | 17,240 | 3,500 | | | 228,916 |
| 1910 | 213,588 | 17,248 | 6,032 | | | 236,868 |
| 1915 | 216,824 | 18,280 | 11,000 | | | 246,104 |
| 1920 | 246,528 | 21,200 | 16,136 | | | 283,864 |
| 1925 | 285,152 | 20,608 | 9,536 | | | 315,296 |
| 1930 | 333,864 | 21,520 | 12,128 | 31,800 | 9,984 | 409,296 |
| 1935 | 319,506 | 21,520 | 12,128 | 46,140 | 9,984 | 409,278 |

* *Davison's Textile Blue Book*, 1914-35. The title from 1891 to 1912-13 was *The Blue Book Textile Directory of the United States and Canada*. Compiled from issues for the years indicated in the table.

ing made to find manufactures which might replace the declining iron industry. It was felt that cotton textiles would partly meet this need. Such a shifting industrial scene, with its forced readjustments and interrupted growth, was an important factor contributing to a feeling of industrial uncertainty.

River development a factor making for uncertainty.—While the readjustments in industries were in progress, the problem of Tennessee River development came to the fore. One phase of this problem, namely improved navigability, had actually been a matter of interest since 1831, as noted at an earlier point. But Tennessee River development from the standpoint of power had not been seriously considered, because of lack of adequate techniques to harness water power on the gigantic scale afforded by the river. During the early part of this period such techniques were being rapidly perfected. As a result, interest turned to the power phase, which served as a new stimulant to the Region's industrial ambitions. The improvement of the Tennessee River for power and navigation progressed in such a way as to lead to intermittent feverish action in new development schemes.

The section of the Tennessee River which had been a persistent barrier to navigation and which possessed the greatest potential water power was the thirty-seven-mile stretch of rapids between Florence and Decatur. This section of the river had been known from earliest times as Muscle Shoals. The first application for a permit to develop the water power of Muscle Shoals was made to the Federal government in 1903, but the permit was not granted. The keen interest displayed in the Shoals at that time induced Congress to cause the problem of their development to be studied more fully. Additional examinations were made and reports submitted between 1905 and 1912. When bids were finally opened for the lease of the water power in 1912, two were received, of which one was approved by the Board of Engineers for Rivers and Harbors. It was not adopted by Congress because the Engineers' Board recommended that if Congress did not approve the project at once, it should make additional funds available for the completion of the detailed surveys, as essential preliminaries to dam construction. The funds were appropriated in the Rivers and

Harbors Act of 1915. Additional surveys and plans were made promptly and submitted to the House in June 1916, "accompanied by a report, which, while recommending the provisional acceptance of the power company offer, also recommended that no action be taken thereon until it had been determined whether Muscle Shoals power would be required by the Government for the operation of a nitrate plant for which Congress had appropriated the sum of \$20,000,000 in section 124 of the National Defense Act of 1916."⁶⁵

Section 124 of the National Defense Act of 1916 had authorized the President, among other things, to have necessary investigations made to determine the best, cheapest, and most available means for the production of nitrates. Recommendations for bringing about an increase in the supply of nitrogen included the cyanamid process for the fixation of atmospheric nitrogen. That process, however, required the use of large amounts of electrical power. The government therefore cast about for suitable sites. From those proposed Muscle Shoals was selected.⁶⁶

The construction of the various units necessary for the production of nitrates brought a large influx of workers. Work on Wilson Dam was started the latter part of 1917, but construction in a large way did not begin until after the Armistice. The cities of Florence and Sheffield enjoyed a sudden expansion of trade. Housing and trade facilities were taxed to the limit. No one, however, interpreted the action of the government as foreshadowing a great industrial boom. Its objectives appeared to be well defined. Nitrate plants were to be operated and power for their operation was to be generated locally. Beyond that point the project seemed to offer no possibilities. As months passed it was discovered that even those objectives might not be attained. When construction work on Wilson Dam stopped for lack of funds toward the end of April, 1921, the outlook was indeed gloomy.⁶⁷

Such was the state of affairs when Mr. Henry Ford, in response to Secretary Weeks' call for bids, made an offer for the project on

⁶⁵ United States Congress, House of Reps., *Muscle Shoals Inquiry*, Hearing before the Committee on Military Affairs on H. R. 16396 and H. R. 16614, Part III, pp. 11-13.

⁶⁶ *Ibid.*, p. 13.

⁶⁷ *Ibid.*

July 8, 1921. Mr. Ford's bid promptly revived the boom spirit. The most intensive speculation centered around Florence and Sheffield, near the site of Wilson Dam. From those cities it spread in lengthening lines until it encompassed, at the height of the boom, the entire east-west length of the lowlands flanking the Tennessee River in the Region.

Mr. Ford's bid served to resurrect all the claims that had ever been made concerning the Region's industrial potentialities.⁶⁸ To these claims was added the new factor of water power, always referred to in minimum terms of a million horsepower and as practically a free good. Lastly, and most important of all, was the fact that Mr. Ford, the nation's leading industrialist, had made the bid.⁶⁹ No further evidence was needed to support the contention that the Region was a potential industrial area of the first order. Mr. Ford, however, had made no commitments beyond the statement that the power of Wilson Dam would be used. How and where he planned to use the power was not indicated.⁷⁰

But that fact was no handicap to those who made it their business to picture the development that would ensue, should his bid be accepted. The free play of the imagination readily evolved a plan which encompassed all of Ford's supposed intentions. This plan was expressed in the short phrase "Seventy-Five Mile City," a city which was to flank the river in an east-west direction and to extend from west of Florence and Sheffield to east of Huntsville.

Once the lateral dimensions had been given, it was not difficult

⁶⁸ Clary, *The Facts about Muscle Shoals*, p. 55: "There is no need to transport the power of Muscle Shoals. The Shoals are in the center of what is undoubtedly the richest manufacturing mineral deposits area in the world. The power generated there may be delivered to manufacturers on the banks of a river that is navigable from that point to the Ohio."

⁶⁹ It was advertised and proclaimed by billboards that Mr. Ford had said he would put a million men to work in the Region. United States Congress, Senate, *Muscle Shoals*, Senate Report 678, to accompany H. R. 518, Part I, p. 27.

⁷⁰ That Mr. Ford had no specific plans as to the manner in which he expected to develop the project is suggested by his own statements. When asked about his plans, he is reported to have answered: "I don't know. We may use all the power to make fertilizer. We may use most of it for manufacturing or we may use it to develop natural resources and make steel or aluminum. We can't tell what we will do until we get at it but we will use the power." Dalton, "Ford Tells What He Hopes to Do with Muscle Shoals," *Automotive Industries*, XLVII (Oct. 19, 1922), p. 751.

to visualize its internal evolution.⁷¹ At first this city was pictured as nothing more than a series of industrial units, loosely knit together by a system of roads, but otherwise separated by productive agricultural lands.⁷² But such an idea could be easily enlarged into something bigger and better, and before long each of the industrial units had expanded until all overlapped and the whole had been welded into one gigantic city "greater than New York." ⁷³

While Congress debated Ford's offer, realtors were busy laying out the future sites of factories and homes. Large firms from a number of northern cities were particularly active in applying their talents to the conversion of farm lands into high-priced lots.⁷⁴ The most feverish activity was in the vicinity of Wilson Dam, on the south side of the river. There the lands were carved into a dense network of lots, and miles of walks and streets were laid out and equipped with elegant light posts. Radiating from

⁷¹ "So clearly has the vision of Ford's seventy-five-mile city been fixed in the imagination of the entire South, and particularly the citizens of Alabama, that thousands of them see it already materialized, and are laying their plans accordingly." *The New York Times*, Feb. 12, 1922.

⁷² Such development was entirely within the realm of possibility. Village industries, manned by workers whose homes were dispersed over the adjacent rural landscape, would have fit readily into the Region. McClung, "Seventy-Five Mile City," *Scientific American*, CXXVII (Sept., 1922), 156-57, 213-14.

In recent years village industries have been established in the state of Michigan by Mr. Ford. By 1936 he had built fourteen small plants along the Rouge and Huron Valleys, within fifty miles of Detroit. "Ford Turns to Small Plants," *Mill and Factory*, XVIII (Jan., 1936), 83-86.

A similar program could have been carried out in the Region. Such an occupancy pattern was, however, contrary to the interests of the land speculators. They had to promote the development of large and densely populated urban centers, in order to advance the price of their lots rapidly.

⁷³ *Christian Science Monitor*, May 5, 1924.

⁷⁴ A few samples of the process of land division and the position of outside firms in that division and redivision were reported as follows by an observer who visited the area at the time the boom was at its peak:

"Scrutiny of the real estate development reveals that by far the larger number of the subdivisions are owned by outside capital: Pinehurst addition, foreign capital; Shoals Ford subdivision, foreign capital; College Place addition, local capital. Streets and sidewalks are being put through this property which is to sell at \$1,200 the lot of 50 x 150 feet. Ten years ago it was marketable at \$500 an acre.

"Then there is Thiessen subdivision, ten acres bought by outsiders, at \$65 an acre, and selling for about \$500. The Bluegrass subdivision of the Muscle Shoal Consolidated Realty Co., an outside company, is to bring big returns." *Christian Science Monitor*, Aug. 23, 1922.

that center for ten and more miles to the east and west, and to the south as far as the base of Little Mountain, was a checkered pattern of white markers dotting the fields and indicating future street intersections. For the south side of the river there were recorded no less than 109 subdivisions, containing a total of over 48,000 lots.⁷⁵

All this speculative activity rested on assumptions that Mr. Ford's bid would be accepted and that he would promptly transform the Region into a beehive of industry. By 1923 it was clear, however, that Congress was not to be rushed into acceptance of Ford's bid or that of any other bidder. Thereafter the boom began to lose its force. When Mr. Ford, in October, 1924, notified the President that his offer had been withdrawn,⁷⁶ the dream of a "Seventy-Five Mile City" came to an unhappy ending.

The Region had once more passed through a boom cycle, and this time it had been a game board for speculation on a national scale.⁷⁷ Some of the rank and file of local citizens may have participated in the speculation, but they certainly did not direct it. Too late came the realization that their communities had been the pawns of speculators, whose primary interest was not to enrich the Region permanently but to unload their holdings at the crest of a wave of artificial prices. For speculation had been confined to land, to the purchase and sale of potential residential areas and industrial sites. Industrial development had been held in complete abeyance while all waited for Mr. Ford to put substance behind their speculative land values. When Mr. Ford withdrew his offer, land companies vanished and left behind a landscape scarred with a network of streets and with buildings in various stages of completion, the whole totally unproductive.

With the collapse of the land boom, the communities once again had to face realities. These realities consisted of heavy indebtedness, incurred through extensions of city services at boom prices, but with community incomes from industry at the same levels

⁷⁵ United States Congress, Senate, *Muscle Shoals*, p. 28.

⁷⁶ United States Congress, Hou. of Reps., *Muscle Shoals Inquiry*, pp. 19-20.

⁷⁷ Realty firms operating in the Region had opened real estate offices "in a great many of the principal cities of the United States." United States Congress, Senate, *op. cit.*, p. 27.

which had prevailed prior to the boom. Once more it became urgent to focus effort on the industrial readjustments mentioned above and on the attraction of new industries sponsored by the communities themselves. The boom had been centered at Wilson Dam and had affected Decatur only mildly, and Huntsville even less. Nevertheless, the slogan "Seventy-Five Mile City" had drawn the latter two centers into the boom orbit and had induced them to pursue a policy of hopeful waiting. As the prospects for great industries sponsored from without vanished, they too had to fall back on their own efforts.

During the Ford episode Congress had voted funds for the resumption of work on Wilson Dam. By the latter part of 1925 work on the dam was nearing completion, and construction on the power hall had progressed far enough to allow the installation of eight hydroelectric generating units.⁷⁸ One year later the entire project was declared completed.

After Mr. Ford had withdrawn his bid, the question of the disposition of the Muscle Shoals project and the general problem of Tennessee River development were further debated. Commissions were appointed to review all plans and to report on the most practical method of utilizing the government property. The Board of Engineers for Rivers and Harbors issued periodic reports on the progress of surveys covering the entire Tennessee River drainage basin. These surveys included "investigations into the potential resources of the Tennessee Basin" and set forth plans "for the most effective improvement of [the stream] for navigation and the prosecution of such improvement in combination with the most efficient development of the potential water power, [and] the control of floods."⁷⁹

Nothing further, however, was done with these thorough surveys and plans until the passage of the Tennessee Valley Authority Act in May, 1933. This act altered the relation of the Tennessee River to industrial development in the Region. Prior to the establishment of the Authority, Wilson Dam had been

⁷⁸ United States Congress, Hou. of Reps., *Muscle Shoals Inquiry*, p. 21.

⁷⁹ United States Congress, Hou. of Reps., *Tennessee River and Tributaries, North Carolina, Tennessee, Alabama, and Kentucky*, pp. 1-2.

regarded as a source of power for the Region only, as was shown by the "Seventy-Five Mile City" concept of the last speculators' boom. Under the Tennessee Valley Authority, power from Wilson Dam was to be distributed at uniform rates far beyond the borders of the Region. Since communities of the Region could no longer consider themselves the sole beneficiaries of cheap power, they at first regarded the new program with some misgivings and even with mild resentment. This reaction was soon modified by the fact that river development was to be undertaken aggressively and that river navigation and low-rate power from hydroelectric stations were finally to become actualities. The period of industrial uncertainty, therefore, extends to the present, when the Region faces an adjustment to the new river functions. The position of the Region in relation to these new functions will be dealt with at a later point.

SUMMARY

The rise of industry in the Region has been described and the major changes in the structure of industry have been noted. It has been seen that industry leaped forward during a brief period between 1880 and 1900 and that the subsequent period was one of uncertainty, characterized by changes in the structure of industry and intermittently dominated by a new program of development centered on the Tennessee River. Industry has inherited from the past a number of forces which will be of continuing influence. Among these should be mentioned: (1) a community "will" to industrialize more fully; (2) an established labor supply, with some experience in industry; and (3) an existing pattern of industrial distribution, to which new developments tend to conform. In the next chapter the present structure of industry in the Region and the position of the Region as an industrial area will be examined. An analysis of the forces carried over from the past will be given at later points.

Chapter III

THE PRESENT POSITION OF INDUSTRY



AS AN INDUSTRIAL area the Region is of minor importance. The 1929 Census presents a list of the nation's leading industrial areas. This list includes thirty-three areas ranked according to the average number of wage earners in industry. The Scranton-Wilkes-Barre area, least important of those listed from the standpoint of the following two measures, is credited with 42,268 wage earners in industry and with a value added by manufactures of \$92,759,097.¹ The Region falls far below the Scranton-Wilkes-Barre area. In 1929 it was credited with 10,084 wage earners in industry and \$15,621,985 as the value added by manufactures.² Compared with the Scranton-Wilkes-Barre area it had 24 percent as many wage earners in industry and 17 percent as large a value added by manufactures.

The minor importance of the Region's industry is also suggested by the proportion it contributes to the total manufactures of the large areas of which it is a part. In the industry of the United States for 1929 the Region played an insignificant rôle, with 0.11 percent of the total wage earners and 0.05 percent of the value added by manufactures. In the state of Alabama the Region was of minor importance, with 8.4 percent of the wage earners and 6.1 percent of the value added by manufactures. It played a slightly more important rôle in the Tennessee Valley, in

¹ *Fifteenth Census of the United States: 1930. Manufactures, I, 243.*

² *United States Bureau of the Census, Biennial Census of Manufactures: 1933. Alabama.*

which it had 10 percent of the wage earners and to which it contributed 8 percent of the value added by manufactures (Table 4).

TABLE 4
POPULATION AND INDUSTRY IN THE REGION
AND IN THREE LARGER AREAS, 1929 *

| REGION | AVERAGE NUMBER OF WAGE EARNERS | VALUE ADDED BY MANUFACTURES (DOLLARS) | POPULATION |
|----------------------|--------------------------------------|---|-------------|
| Region | 10,084 | 15,621,985 | 270,732 |
| Tennessee Valley ... | 99,766 | 195,821,000 | 2,342,699 |
| Alabama | 119,559 | 258,124,744 | 2,646,248 |
| United States | 8,838,743 | 31,885,283,711 | 122,775,046 |

* Sources: *Fifteenth Census of the United States: 1930*. Manufactures, Vol. III; Population, Vol. III, Parts 1 and 2. *Biennial Census of the United States: 1933*. Alabama. Data for the Tennessee Valley were compiled from the schedules of ninety-five counties that lie within, or that have most of their area within the watershed.

The per-capita value added by manufactures in the Region is less than the per-capita value added by manufactures in the larger areas listed in Table 4. For the United States the per-capita value added by manufactures in 1929 was \$259.70, for Alabama it was \$97.54, for the Tennessee Valley \$83.58, and for the Region \$57.69. The degree of industrialization in the Region is therefore less than in any of the larger areas of which it is a part.

The rate of growth of industry in the Region has been slower than the rate of growth in the whole of Alabama or the United States. Industry in the Region increased nineteenfold from 1860 to 1929, when measured in terms of value added by manufactures. For the same period and by the same measure Alabama had a forty-threefold increase, while industry in the United States increased thirty-sevenfold. Figure 3 (page 17) indicates that for only one decade, 1880 to 1890, the Region had a more rapid rate of growth than the whole of Alabama or the United States. The combination of influences making for the rapid growth during that decade has been explained at an earlier point. The slower rate of growth in the Region is particularly evident since 1900.

THE POSITION OF INDUSTRY WITHIN THE REGION

Industry and agriculture.—Industry within the Region is subordinate to agriculture. There is no entirely satisfactory measure by means of which the relative position of industry and agriculture can be expressed quantitatively. But a comparison of the value added by manufactures with the gross receipts from the sale of farm products, plus the value of products traded and used by farm operators and their families, less expenditures for feed and fertilizer, will give some idea of their relative importance. In 1929 the gross farm income, less expenditure for feed and fertilizer, was \$29,173,000.³ The value added by manufactures was \$15,621,985, or 53 percent of the value figure given for agriculture. This measure suggests that agriculture remains the Region's foremost occupation.

Contributions by industry to the Region.—The minor importance of the Region as an industrial area has been shown and industry's subordination to agriculture has been indicated. But such a quantitative picture tends to underestimate the contributions industry makes to the economy of the Region. Probably as many as 50,000 persons, or 18 percent of the Region's total population, derive their livelihood from manufactures, as paid workers, salaried employees, or owners, and as the direct dependents of these. If allowance is made for the trades, professions, and local service industries which would vanish should industry decline, the proportion would have to be set higher.

The groups of industries.—The persons thus dependent on manufactures derive their livelihood from several groups of industries. The Census has no schedule of manufactures by groups on a county or regional basis. Field data on the number of establishments and workers are used to determine the relative importance of each group. It has seemed best to omit from the grouping those industries which provide local services only, such as ice plants and bakeries. The only locational factor of these industries is the local consumer, since local service industries arise from the

³ Calculated from the *Fifteenth Census of the United States: 1930*. Agriculture, II (Part 2), 1041-44; III (Part 2), 678-83.

demands of the existing local population and the volume of business they do rises and falls in accordance with the number of people they can serve locally, modified by the standard of living of those people. But the size of the local population and its purchasing power is dependent in the last analysis on the Region's basic productive factors. The groups of industries resting on these basic factors are the concern of this study and will now be described (Table 5).

Textiles dominate the Region's industry. Measured in terms of the number of workers, the group is twelve times as important as industries processing iron, and eighteen times as important as the chemical group. Of the sixteen textile establishments six have been erected and placed in operation since 1925. During the summer months of 1935 these new plants employed approximately 30 percent of the workers engaged in the textile industries. Two of the plants established prior to 1925 were idle.

Among the primary forest-product plants, the sawmills are the most numerous and at the same time the most scattered. All fall within the smallest classification of the Southern Forest Service, namely from 1 to 19 M board-feet capacity per ten-hour day. Among the non-lumber forest-product industries, a box and basket factory held first place in 1935 and a tannin extract plant was second in importance. The remaining establishments are small and have a desultory output. The large non-lumber forest-product plants erected during the period of industrial promotions have, with one exception, disappeared from the Region and the forest-product industries as a group have been relegated to a position of minor importance.

The iron and steel works of the Region use scrap iron and Birmingham pig iron in the manufacture of stoves and ranges, household ironware, lamp posts, and ornamental ironware. One firm also cuts purchased structural iron and steel into shapes desired for bridge work and other construction purposes. Four small foundries and machine shops have been omitted from Table 5. The plants are scarcely more than large-size blacksmith shops. They fabricate no given line of goods, although they do turn out an occasional casting for firms outside the Region. During the

TABLE 5

INDUSTRIES IN THE REGION BY MAJOR GROUPS, SUMMER, 1935 *

| INDUSTRIES BY GROUPS | NUMBER OF PLANTS | NUMBER OF WORKERS |
|--|------------------|-------------------|
| Textiles and their products..... | 16 | 6,845 |
| Cotton goods | 9 | 4,930 |
| Knit goods | 6 | 1,825 |
| Silk goods | 1 | 90 |
| Forest products | 252 | |
| Lumber and timber | 243 | |
| Non-lumber | 9 | 255 |
| Iron and steel products | 4 | 540 |
| Structural and ornamental iron and steel works | 2 | 340 |
| Stoves and ranges, ironware | 2 | 200 |
| Chemicals | 7 | 340 |
| Cottonseed: oil, cake, and meal.... | 4 | 210 |
| Fertilizer | 3 | 130 |
| Stone and clay products..... | 6 | 70 |
| Limestone and asphalt-rock products | 3 | 20 |
| Clay products | 3 | 20 |
| Rubber products: inner tubes | 1 | 60 |
| Transportation equipment: wagons... | 1 | 50 |
| Electrical equipment: ranges and appliances | 1 | 30 |
| Railroad shops | 2 | |

* Sources: Data on forest products from Department of Agriculture, Forest Service, Southern Forest Experiment Station, "Forest Industrial Plants in Alabama." Data on the number of workers in four textile establishments from *Davison's Textile Blue Book, 71st Year* (1936). Other data from field notes. For the seasonally idle establishments, such as cottonseed oil plants, the number of workers given is for the period of operation. Idle factories kept in operating condition are included in the number of plants listed.

summer months of 1935 the four shops employed fewer than twenty workers.

The fertilizer plants listed under chemicals are with one exception little more than mixing and distribution stations. They receive the fertilizer ingredients, mix them in desired proportions,

and arrange for shipment to the consumer. The exception is the Tennessee Valley Authority plant, processing phosphate rock and manufacturing concentrated superphosphate. The establishments expressing oil from cottonseed are dependent on a by-product raw material. Their function is limited to the processing of cottonseed derived from cotton produced within the Region and its immediate surroundings.

Of the remaining industries, the establishment manufacturing wagons at one time produced between 10,000 and 12,000 units per year. Due to a falling off in demand, its output has been declining in recent years, but the concern continues to rank among the important wagon manufacturers of the nation. Its location in the Cotton Belt, where demand for light wagons has continued, has given this concern a marketing advantage in recent decades not possessed by large wagon manufacturers north of the Ohio River. The inner-tube factory is a recent addition to the Region, but it is already well established and output is mounting. The plant manufacturing electric ranges had facilities for the employment of many more workers than the thirty recorded for the summer of 1935. Inability to find an outlet for its wares limited its operations.

The schedule of industries in Table 5, taken in conjunction with the account of industries at the close of the period of industrial promotions, 1890 to 1900, again emphasizes the great shift that has occurred in the industrial structure of the Region. The industries located primarily on the basis of raw materials, such as the iron and forest-product groups, now hold positions of minor importance, while the textiles, after a long period of continuing expansion, outweigh all other industries combined, when measured in terms of the number of workers. The shifts in the relative importance of groups of industries have resulted in changes in the relative importance of the centers of industry. In the next section these centers are described.

THE CENTERS OF INDUSTRY

The distribution of industries within the Region conforms closely to the pattern that evolved during the period of industrial

promotions following 1880. All factories are located either within or immediately outside of several small cities. The cities may be grouped so that three centers of industry emerge. These are (1) the Huntsville center, (2) the Decatur center, and (3) the tri-city center (Fig. 1, page 4).

The rise of these centers as points of population concentration dates back to the early period of settlement within the Region. Industry, therefore, had no connection with the original motives behind their location. Huntsville, founded in 1809, had its site determined by a magnificent spring and its growth stimulated by the productiveness of the surrounding cotton lands, of which it became the trading center.⁴ Decatur and Florence started as river ports, located respectively at the upper and lower ends of Muscle Shoals. Tuscumbia was established as the trading center for the rich cotton lands in its vicinity.⁵ When railroads were built in the Region or projected into it, they converged at the largest existing villages and cities. This strengthened the position of the centers as trade foci and enabled them to command the wealth and commerce of larger rural tributary areas. With the coming of promoters of industry, these centers were the natural points from which the promotion activities could be projected. The early commercial advantages of the centers were now exploited for industrial purposes. River and railway transport facilities provided the means for raw-material assemblage and the marketing of manufactured wares. Retail trade establishments, limited banking facilities, and postal service were available. Adjacent to the centers was abundant land which could be purchased cheaply and which was suitable for residence space and factory sites. During the period of industrial promotions, these centers therefore acquired many new industries, and in the subsequent period of industrial readjustment it was natural that they should make determined drives to secure new types of industries to replace those of declining importance. As the centers added manufactures

⁴ Betts, *Early History of Huntsville, Alabama*, pp. 23-28.

⁵ Sheffield is the only city that owes its origin to the era of industrial promotions. Its location at the lower end of Muscle Shoals, between Florence and Tuscumbia, represented an extension of urban development which had started in 1818 with the rise of Florence.

to their former functions of trade and distribution, their power to attract new facilities increased. Consequently such recent developments as arterial highways and trunk power lines display the convergence at these centers already noted for the railways. A description and analysis of each of these centers will bring into more detailed relief the present distribution of industry within the Region.

The Huntsville center.—Greater Huntsville is the most important industrial center in the Region. It embraces Huntsville proper and a number of mill towns and subdivisions which surround it. Among the latter, Dallas, Lincoln, West Huntsville, and Merrimack are the most important. Huntsville is the commercial center for these units and all are woven into the occupance pattern of the old center by many interconnecting streets and highways. Since greater Huntsville is the only industrial unit in Madison County, the Census schedule of manufactures by counties may be used to indicate its approximate importance in the Region. In 1935 Madison County had 50 percent of the Region's average number of wage earners and contributed 40 percent of the value added by manufactures.⁶

The Huntsville center is devoted almost exclusively to the manufacture of textiles. Other types of manufactures have been tried from time to time, but have never proved successful enough to warrant expansion and in many instances have failed after a brief trial period. The present industrial complex includes four establishments not devoted to textiles. The non-textile industries comprise a plant processing cottonseed, a small veneer works, a plant turning out dimension stock for textile establishments, and an electric range and appliance factory. Of the workers in industry in greater Huntsville, not including those in local service industries, textiles engaged more than 95 percent.

The beginnings of the manufacture of textiles have already been traced through the period of industrial promotions. From the 91,000 spindles recorded for the center in 1900, the industry has continued to expand to its present position of 319,000 spindles

⁶ United States Bureau of the Census, *Biennial Census of Manufactures: 1935*. Alabama.

and, in terms of that measure, has put greater Huntsville in first place among the textile centers of Alabama (Table 3, page 31).

The success of textiles in the center cannot be entirely explained, because some evidence lies buried in company records not available for investigation. A view of the center's growth since the first large industrial promotions, however, brings into focus the important factors operating toward the success of the industry.

The Huntsville center lies at the western base of the Cumberland Plateau. Outliers of the plateau partially surround the city. During the early history of Madison County, the upland remnants and the plateau proper were occupied by settlers. Population increased rapidly, to a point where the land under the prevailing system of use supplied only the most meager returns. With the coming of industry to the Huntsville lowland, the plateau area therefore served as a large reservoir of low-cost labor, supplying the type of white labor that figured so prominently in bringing cotton textiles to other parts of the South.

The location of Huntsville on a broad lowland, partly surrounded by plateau remnants, is highly attractive. Monte Sano, an outlier of plateau flanking the city on the east side, has long been a resort center and summer retreat. The pleasing setting of Huntsville was early commercialized and drew many visitors, among them individuals of wealth and industrial experience. A number of men thus attracted played an important rôle in bringing industries and in financing some of the early plants.⁷

Another factor which appears to have operated in the attraction of industries to the center is the unusually fine supply of ground water from giant springs. To some of the first mills this water was offered free for a period of years. One large mill secured permanent rights to a large spring near its plant site and that fact was one of the primary considerations in bringing it to the center.⁸ Mills established later were assured an adequate water supply from shallow wells with great volume.⁹

⁷ Chapman, "Huntsville Life in the Gay Nineties," *Huntsville Times*, July 1, 1934.

⁸ *Ibid.*, July 8, 1934.

⁹ Johnston, *Groundwater in the Paleozoic Rocks of Northern Alabama*, p. 271.

Although a textile plant had been in operation in the center since 1881, the bringing of cotton textile establishments by inducements did not begin until 1890.¹⁰ By that date the spread of cotton textiles to the South was well under way. The center was introducing an industry that had successfully passed its trial period under southern conditions. As the first mills demonstrated their local success through plant expansions and substantial dividend payments,¹¹ other mills were attracted until the center as known today emerged.

The Huntsville center, therefore, experienced no drastic industrial readjustment following the period of industrial promotions. Manufactures other than textiles were tried, but at no time did the center have large-scale industries designed to process mineral raw materials or forest resources. Remoteness from the brown iron ores appears to have precluded any attempts at the pig-iron industry, although the location of the center away from the Tennessee River may also have been of significance. Such a location gave Huntsville no opportunity to harbor illusions concerning the utility of that stream in handling raw materials and pig iron. The non-lumber forest-product industries were of some importance, but the best available stands of timber were along the Tennessee River and too inaccessible for plants located in the Huntsville center. The forest-product industries, therefore, never attained the magnitude characteristic of that group in the centers located next to the Tennessee River.

The Decatur center.—Decatur ranks second in importance among the industrial centers of the Region. Since it is the only center of industry in Morgan County, the Census schedule by counties may serve to indicate approximately its importance in the Region. In 1935 Morgan County had 23 percent of the Region's average number of wage earners in industry and contributed 25 percent of the value added by manufactures.¹²

The industrial make-up of this center is somewhat diverse. Textiles are in the lead, with two silk-hosiery mills, one tire cord

¹⁰ Chapman, *op. cit.*, July 1, 1934.

¹¹ *Ibid.*

¹² United States Bureau of the Census, *Biennial Census of Manufactures: 1935*. Alabama.

and fabric factory, and one silk mill. These four establishments engaged 70 percent of the workers in industry during the summer months of 1935. The silk mill has since been discontinued, but it employed no more than ninety workers and contributed only in a minor way to the textile group. Other manufactures include a box and basket factory, a barrel-stave plant, one tannin-extract plant, two mills processing cottonseed, two brick and tile factories, and a structural and ornamental iron and steel plant. But this industrial composition is a product of the last decade.

It has been shown at an earlier point that the first large industries of the Decatur center were designed to manufacture iron and wood products and railroad supplies. Some of these plants had hardly been erected when declines and changes set in. The charcoal iron furnace, which appears to have operated for only a few months, was dismantled in 1900.¹³ The wood-alcohol and charcoal plant, associated with the iron furnace, disappeared likewise. The railroad car factory failed as early as 1892,¹⁴ and the plant manufacturing car wheels moved from the center to Birmingham about 1900.¹⁵ Such woodworking industries as a large planing mill, a chair factory, and a pencil factory declined. Other woodworking industries continued to operate, or came into the center to replace those that had disappeared. With the decline of the plants mentioned above, the released labor was absorbed by the expanding shops of the Louisville and Nashville Railroad. In 1920 these shops employed over 2,000 workers, with a weekly pay roll of \$55,000. After 1920 the Louisville and Nashville Railroad began its program of shop consolidations. At the Decatur shops, operations were gradually curtailed and employment fell lower and lower. With much labor unemployed and no large pay roll to help support service industries and retail shops, the need for new industries became truly urgent. The consequent drive brought in the manufacture of textiles, now firmly established and in continuous operation.

The new textile plants are branches of larger corporations. The

¹³ *Directory of the Iron and Steel Works of the United States*, 10th ed. (1890), p. 47; 16th ed. (1904), p. 368.

¹⁴ *Ibid.*, 10th ed. (1890), p. 249.

¹⁵ *Ibid.*, Supplement to 15th ed. (1903), p. 62.

motives that induced them to locate differ in each instance. The purchase of recently erected factory buildings and equipment from local interests at receivership prices was a consideration in two cases. One of the two plants thus acquired was designed for the manufacture of tire cord and fabric. The corporation that acquired the factory had for some time been operating tire-cord and fabric mills in the South. Location at Decatur was particularly favorable, for it afforded easy access to both Akron, Ohio, and to near-by Gadsden, Alabama, where the corporation had recently opened a tire factory.

From a long-time point of view, all the new plants regard the Decatur center as well qualified to serve their needs. Among the favorable factors is the released labor mentioned above. The well-developed transport facilities provide prompt service. The Decatur center lies at the crossroads of important east-west and north-south railroad lines and serves as a similar junction for main highways. Its location on the Tennessee River assures at all times an abundant supply of industrial water, though the problem of purification has to be met.

The present Tennessee River development program carries with it the possibility that additional advantages may accrue to the center in the near future. With the completion of the program a nine-foot navigable channel will be available upstream to Knoxville and downstream into the waterways of the Ohio and Mississippi Rivers. The significance of such navigability is considered more fully for the Region as a whole in the discussion of inland waterways, Chapter V.

The tri-city center.—This center comprises an agglomeration of cities and government property at the lower end of Muscle Shoals. Florence, Sheffield, and Tuscumbia are well-established cities and the term tri-city covers these three. The so-called Muscle Shoals City also claims membership in this group, but the place is hardly more than a phantom.

With the exception of sawmills and a number of asphalt-rock processing industries, the tri-city center takes in all industry of Colbert and Lauderdale Counties. In 1935 these two counties had 21 percent of the average number of wage earners of the

Region and contributed 24 percent of the value added by manufactures.¹⁶

Industry in the tri-city center is divided chiefly between iron products and cotton textiles. The three cotton textile plants engaged 65 percent of the center's industrial workers during the summer of 1935. The plants manufacturing iron products consist of two stove and range factories, and one plant producing light posts, ornamental iron, and commercial castings. This group employed 23 percent of the industrial workers. Other establishments include one wagon factory, a fertilizer plant, a plant processing cottonseed, and one inner-tube factory. This list should also include the two government chemical plants which dominate the center's landscape on the south side of the Tennessee River and which were erected during the World War for the manufacture of synthetic nitrates.

The present structure of industry in the tri-city center still shows the influence of the pig-iron industry, which passed from the scene as recently as 1929.¹⁷ The largest of the iron-product industries was established in Sheffield in 1926. One of the factors inducing the concern to establish here, though very likely not the determining one, was the assurance that local blast furnaces would supply pig iron at Birmingham prices, to which a switching charge of \$0.12 a ton had to be added. But since the abandonment of the Sheffield iron industry in 1929, this plant has had to draw its pig iron from Birmingham at Birmingham prices, plus \$1.25 per ton freight charge. The foregoing statement does not imply that the existing iron-product industries will disappear. But these industries would very likely not be present to the extent indicated if a local pig-iron supply had not served as an attracting feature for a number of decades.

The Wilson Dam project has been an important factor affecting the outlook of the tri-city center for long intervals during the last two decades. Attention was diverted from local industries to plans emanating from Washington. When these plans did not

¹⁶ United States Bureau of the Census, *Biennial Census of Manufactures: 1935*. Alabama.

¹⁷ *Directory of the Iron and Steel Works of the United States*, 21st ed. (1930), p. 307.

materialize in the form of active chemical industries, the center undertook its own quest for industrial concerns which might be induced to establish themselves there. Since 1925 the search has led to the founding of the above-mentioned iron-products plant, a large knitting mill located in Florence, and an inner-tube factory located in a rural setting to the east of Tuscumbia. With the establishment of the Tennessee Valley Authority, the government plants, long idle, have become active. Part of Plant Number 2, located to the east of Sheffield, has been converted into an experimental unit for the reduction of phosphate rock, and has been in operation since 1934. This activity has once more focused attention on these plants. In 1935 they were looked upon as symbols pointing the way to a new period of industrial growth, under the stimulus of the Tennessee Valley Authority.

The local setting of the tri-city center appears to offer many attractions for industry. Majestic Wilson Dam, with its large hydroelectric power hall, is a part of the center. The Tennessee River, with Florence on the north side and Sheffield and Tuscumbia to the south, is accessible for navigation and for domestic and industrial water supplies. At the same time, it is no longer a barrier to close industrial coöperation between opposite stream sides, for it is spanned by the roadway across Wilson Dam, by a railway bridge, and by an old highway bridge on the upper level of the railroad bridge. A first-class highway bridge linking Florence and Sheffield was completed in 1939. The center is the junction of east-west and north-south railroads, though the north-south road is only a branch line with infrequent service. Highways converge at the center in similar fashion. The significance of these facilities to industry, viewed in the regional and national setting, will be examined at a later point.

Isolated industrial establishments.—In various parts of the Region are located isolated industrial establishments that must be included, to complete the picture of industrial distribution within the Region. Of these the largest, from the standpoint of number of workers employed, is a cotton spinning and weaving plant which has been in operation in Russellville (Fig. 1, page 4) since 1928. Six miles southwest of Russellville is the village of Rock-

wood, the site of limestone quarries and works. Elaborate equipment is in place for cutting and shaping the stone. A small pottery south of Russellville, near Spruce Pine, manufactures crocks, jars, jugs, and churns. The city of Athens has had a cotton textile factory since 1901. The plant was engaged in spinning and weaving for more than twenty years and was then converted into a knitting mill. Since 1931 it has been idle. One small non-lumber wood-product industry is located in New Market, Madison County, one in Russellville, and two in Red Bay, Franklin County. Lastly there are scattered throughout the Region 243 small sawmills, many of which are portable.

THE PRESENT ATTITUDE TOWARD INDUSTRY

There remains to be pointed out the present attitude toward industry in the Region, as displayed by various civic organizations and by the communities as a whole. It can be stated at the outset that all the centers are conscious of the presence of industry and all are eager to promote industrial growth. The desire to make of the Region a more important industrial area is indicated by the expressions of individuals, by the attention given the subject in local newspapers, and by the activities of community organizations.

At the dedication of Wheeler Dam, September 10, 1937, Speaker William B. Bankhead of the House of Representatives delivered the dedicatory address. In the course of his speech he is reported to have expressed his confidence in the industrial prospects of the Region in the following words: "I state without fear of the prophecy being repudiated in the future that this area will be, within the next few decades, the greatest beehive of industrial and social development anywhere in the nation."¹⁸ This prophecy admittedly sounds much like an echo of the promotion literature of 1818 or 1888, but its significance lies in the fact that it strikes a note the Region still likes to hear. The concept of the "Seventy-Five Mile City," which evolved during the Ford episode, has not been entirely forgotten.

The Region's attentiveness to industry is frequently reflected

¹⁸ *The New York Times*, Sept. 12, 1937.

in the local newspapers. The anniversaries of the establishment of important manufacturing concerns afford opportunities for reviews of the growth of industry in the community. Such reviews give data on the weekly pay roll and on the number of workers employed. All sections of community society are reminded that they have a vital interest in the maintenance and progress of industry. Negotiations for a new industrial concern are followed closely by the public, and the prospect that such a concern may locate in the neighborhood is news that takes first place on the front page.

Various civic organizations devote much effort to the fostering of industry. These organizations enlist the support of many elements in the community. The creation of new employment opportunities is always of interest to labor. More employment results in a larger community income, and this stimulates the interest of merchants, who desire increasing retail trade, and the professional groups, who look to the expansion of their services. The benefits from new employment are thus compounded and reach into all phases of community service and activity. Hence the widespread interest in industry.

All the Region's centers of industry support chambers of commerce. These organizations direct and finance industrial surveys, negotiate for new industrial concerns, and collaborate with transportation agencies and established industries to improve the industrial position of the respective communities. Their published bulletins and leaflets set ambitious industrial goals or emphasize industrial advantages held by the respective communities.¹⁹

¹⁹ The following statements illustrate the industrial point of view presented by such leaflets and bulletins:

"The proximity of great mineral deposits along the Tennessee River, iron, aluminum, magnesium, phosphate rock and other important raw material, and cheap electric power (which can now be purchased from the Tennessee Valley Authority) combine to make Florence the future center of a great industrial area." *Come to Florence Alabama*, Leaflet of the Florence Chamber of Commerce.

"No one has ever visited the Muscle Shoals District without marveling at the tremendous possibilities there for the future. The Government surveyed the Nation to find the most logical location for these industries, and decided that the Muscle Shoals District possessed all the requirements: transportation, minerals and material, ideal climate, with health conditions unsurpassed; and with undeveloped natural resources and power which had lain hidden here awaiting its discovery by mankind." *Salute to Colbert County*. Prepared by J. G. Baker, Secretary of the

It is clear, therefore, that the will to industrialize more fully is a significant community and regional attitude and is a factor with which any analysis of the Region's industry must reckon. Given intelligent guidance, it can be counted upon as an important factor operating for the good of the Region. The methods being employed to translate this will into action, and the possible consequence of such methods, will be examined at a later point.

SUMMARY

Despite the fostering of manufactures for more than half a century, the Region continues to be a minor industrial area with small industrial centers. But the will to industrialize more fully still asserts itself, and this attitude finds new encouragement in some recent successful shifts in the character of industry and in the new river development program of the Tennessee Valley Authority. Whether such a drive for industry will be rewarded by a new industrial upsurge will be more fully explored through an examination of the factors that operate in the location of industry in the Region. The next three chapters present an analysis of the power resources, the mineral raw materials, the industrial water supply, the agricultural resources, the forest raw materials, markets and transportation facilities, industrial sites, the residence space, and the human factor.

Chamber of Commerce of the Muscle Shoals District, Sheffield, Alabama, and delivered over WAPI, August 15, 1932, at the time of the Salute from the Protective Life Insurance Company of Birmingham to Colbert County, Alabama.

"Decatur with its supply of native white labor, low power, water and tax rates, offers outstanding advantages to any industry seeking improved manufacturing conditions." *Decatur, Alabama: The Richest Agricultural and Industrial Center in the Tennessee Valley*. Leaflet issued by the Decatur Chamber of Commerce.

"The proximity of raw material, cheap electric power and wonderful supply of efficient labor and other natural advantages make Huntsville preeminently a manufacturing city..." *Huntsville and Madison County: Happy Hustling Huntsville*. Bulletin of the Huntsville and Madison County Chamber of Commerce, Dec., 1919.

Chapter IV

RESOURCES AND RAW MATERIALS



INDUSTRIAL opportunity in the Region depends on the Region's comparative advantages, for this small area can produce only if it can successfully meet its competitors in the nation's markets. Hence each locational factor of industry will have to be analyzed in terms of a scene much wider than the Region. Industry in the Region, like industry everywhere, faces constantly changing techniques and new discoveries which may alter the significance of various locational factors in short periods of time. Each factor, therefore, will have to be considered in terms of the latest techniques. From such an examination, made in this and the following two chapters, conclusions will be drawn as to the future importance of each factor. The final chapter sets forth what appear to be desirable lines of growth, based on an analysis of the locational factors.

THE POWER RESOURCES

Power for the Region's industries is abundant and can be purchased on an exceptionally low rate basis. This situation is a recent development. It has come about through the development of the Tennessee River for flood control, navigation, and power. Flood control calls for the impounding of flood waters, hence dams. River navigation calls for a given channel depth. This is also attained by raising the water level through impoundings, hence additional dams. Instead of allowing the water to spill over the crest of the dams as it moves downstream from one reservoir

level to the next, it is so directed that it expends its energy generating electricity.¹ The possible output of water power is great, because of large stream volume and an average combined head of 235 feet at dams in and adjacent to the Region. Power for the Region's industries is therefore abundant. That this power is available on a low rate basis is due to the low-rate policy of the Tennessee Valley Authority.

Water power.—In 1936 the Alabama Power Company turned over to the Tennessee Valley Authority its distribution facilities for electricity for most of the Region. By the close of 1939 all the centers of industry and the counties in which they are located, with the exception of Huntsville and Madison County,² were served by the Tennessee Valley Authority directly or by the Authority through municipal systems and coöperatives. The energy fed into the distributing system comes largely from the hydroelectric stations associated with Wilson and Wheeler Dams. Flanking the Region to the west and to the east are the two dams known as Pickwick Landing and Guntersville, both of which have facilities for the generation of power. The power houses of the four dams are interconnected with upstream power houses by means of 154-kilovolt transmission lines. The electrical energy that can come from the power stations associated with the named dams is indicated in Table 6.

The primary power output, as indicated in Table 6, is assured by augmenting stream flow during the normally low-water season with water released from storage reservoirs behind Norris and Hiwassee Dams. The minimum continuous power available at the four dams can supply 2,706,000,000 kilowatt hours of energy per year. Output of electric power in the state of Alabama in 1935 was 2,173,000,000 kilowatt hours and in the state of Tennessee 1,234,000,000 kilowatt hours.³ The possible primary power

¹ That flood control and improved navigation on the Tennessee River are the primary functions of the dams, while water power is nothing more than a by-product function, is the viewpoint stressed by the Tennessee Valley Authority. Tennessee Valley Authority, *Annual Report, June 30, 1936*, p. 25.

² The textile concerns of Huntsville and vicinity either have their own power plants or they purchase power from the Alabama Power Company.

³ United States Department of Commerce, *Statistical Abstract of the United States: 1936*, p. 349.

TABLE 6

ASSURED CONTINUOUS POWER OUTPUT AND POWER CAPACITIES
OF TENNESSEE RIVER HYDROELECTRIC PLANTS
WITHIN AND ADJACENT TO THE REGION *

| POWER STATION | INSTALLED CAPACITY (KILOWATTS) | ULTIMATE IN- STALLED CAPACITY (KILOWATTS) | PRIMARY POWER, PARTIAL STREAM- FLOW REGULA- TION ASSUMED (KILOWATTS) |
|----------------------|--------------------------------------|---|--|
| Wilson | 184,000 | 444,000 | 122,000 |
| Wheeler | 64,800 | 259,200 | 66,000 |
| Pickwick Landing ... | 72,000 | 216,000 | 76,000 |
| Guntersville | 72,900 | 97,200 | 45,000 |

* Sources: Figures for installed capacity and ultimate installed capacity are from the Tennessee Valley Authority, *Annual Report, June 30, 1939*, pp. 16-19. Primary-power data are from the Tennessee Valley Authority, *The Unified Development of the Tennessee River System*, p. 59.

output of the four dams, and its comparison with electric power production in whole states, emphasizes the large supply of electric power which is available in and adjacent to the Region. No inclusion of secondary power has been made in this estimate.

Secondary power at each of the dams can be generated in varying amounts and for varying lengths of time, depending on seasonal and year-to-year fluctuations in stream flow, as caused by variations in precipitation and consequent variations in run-off from the whole or parts of the Tennessee River watershed. Stream-flow fluctuations can be mitigated by the creation of large reservoirs for regulatory purposes, but they cannot be eliminated entirely. It is to make the fullest use of the waters over and above the volume required to maintain the primary power production that provisions have been made at all the power houses for large ultimate installations (Table 6). Secondary power, produced by such waters and available for a considerable part of each year, affords an economical source of energy for industries which are large power consumers.

But the primary and secondary power thus available is, of course, in no way the peculiar property of the Region. Transmission lines from the large power houses are being constantly

extended and energy is being transmitted beyond the borders of the Region to cities, industrial plants, and rural customers in Georgia, Tennessee, Mississippi, and Arkansas.⁴ The location of the hydroelectric generating plants in the midst of the Region does not give the Region's industries prior rights to the power, but it is an advantage to them. Power disposed of near the dams is available more certainly and can be distributed without energy losses. This is recognized in the rate structure of the Authority, which provides for a special low rate schedule covering power sold at the switchboard of the hydroelectric generating plants. The savings in power costs that can be effected by locating a large power-consuming industry in the vicinity of the power stations is shown by the following example.

A plant requiring 154,000,000 kilowatt hours of energy per year, with 50 percent of the demand supplied from secondary power for 300 days of the year, can purchase such energy transmitted over the Authority's high tension lines at an average annual net charge of 2.71 mills per kilowatt hour. But if such a plant should locate in the vicinity of the large dams and purchase such energy at the switchboard of the Authority's hydroelectric generating plants, the average annual net charge would drop to 2.16 mills per kilowatt hour, with an annual saving in power costs of approximately \$85,000.⁵ The Region, therefore, can claim as a definite industrial advantage the large hydroelectric generating stations located within its midst.

The average net charges for power indicated in the preceding example are low enough to rank as exceptional. Such low rates are available to large industrial consumers buying power directly from the Authority and only on condition that a given percentage of secondary power be used. The plants of the Monsanto and Victor Chemical Companies, located in Maury County, Tennes-

⁴ The Tennessee Valley Authority sells power to the Arkansas Power and Light Company. The point of delivery of the power is the South Memphis substation near Memphis, Tennessee. From that point the power is distributed by the Arkansas Company through its own system. Tennessee Valley Authority, *Annual Report*, June 30, 1937, pp. 294-300.

⁵ Calculated from the schedule of electric power rates, as given in the power contract between the Tennessee Valley Authority and the Monsanto Chemical Company. Tennessee Valley Authority, *Annual Report*, June 30, 1936, pp. 198, 203.

see, and the plant of the Electro Metallurgical Company, built in 1939 near the tri-city center, fall into this class. At Niagara Falls power is purchased, under long-term contracts made years ago by a few large industrial consumers, at an average net charge below 2 mills per kilowatt hour, if continuous energy consumption for the contracted demand is assumed. But even at Niagara Falls most of the energy to large consumers sells at a minimum of 2.5 to 3 mills.⁶ On the Pacific Coast a few large power consumers also pay average net charges that are below 3 mills per kilowatt hour. Among the lowest rates on the Pacific Coast are those of the Bonneville Dam project. Primary power "at site rates" may be purchased at about 2 mills per kilowatt hour if the demand is relatively constant, while primary power at "transmission system rates" may be purchased at net rates of about 2.5 mills per kilowatt hour.⁷ Such low rates do not prevail elsewhere in the nation.

The most common form of power contract between the Tennessee Valley Authority and industrial concerns is that based on the rate schedule set forth in the Authority's Basic Industrial Rate—Schedule B-3.⁸ This schedule also establishes the industrial resale rates, which municipalities and power associations charge for power purchased at wholesale from the Authority. Schedule B-3 applies in the entire territory served by the Authority, so that outlying centers of industry purchase power on the same rate basis as industrial centers near the dams within the Region. Though this schedule gives no advantage to the Region over other areas served by the Authority, it does provide net energy charges that are much lower than those that prevail in many other sections of the nation. The complexity of rate structures for industrial power is such that no representative regional rate schedules are available for comparison with the Authority's Schedule B-3. But the average net charge for power under Schedule B-3 may

⁶ Holmes, *Plant Location*, pp. 102-3.

⁷ Calculated from Federal Power Commission, "Bonneville Project Rate Schedules."

⁸ An examination of the individual power contracts between the Authority and various industrial concerns shows that all but the electrochemical and electro-metallurgical plants purchase power under Schedule B-3. Tennessee Valley Authority, *Annual Report, June 30, 1937*, pp. 135-327.

be computed from a series of demand-and-energy billings and then compared with average net charges for power supplied by utilities in various industrial areas of the nation. Such net charge comparisons are presented in Table 7. These data show that industries in the Region purchasing power under Schedule B-3 are also favored with net power charges that are exceptionally low.

How long will the Region be favored with power rates that are exceptionally low? This question is obviously of importance to the future of industry in the Region, but it cannot be answered definitely. The river development program of the Tennessee Valley Authority is still in a stage of rapid evolution. Inasmuch as it is a multiple-purpose project, costs are allocated to several river functions provided by the construction. Of the total estimated cost of the ten-dam system⁹ 47.3 percent has been provisionally allocated to power, 28.4 percent to navigation, and 24.3 percent to flood control. These are cost allocations made by Col. T. B. Parker, the Authority's chief engineer, and were presented in testimony before the Congressional committee investigating the Authority.¹⁰ Low energy charges are therefore based partly on the fact that large proportionate cost allocations can be made to flood control and navigation. For purposes of this study it is of fundamental importance to note that, under such cost allocation, low net charges for power can be made to cover power cost development on many of the nation's important rivers. Among such rivers may be cited the St. Lawrence, the Ohio system, the Columbia, and many lesser streams both in the South and elsewhere. Ample evidence is available to show that such river development has been considered. In the Columbia River basin it is, of course, well under way. On June 3, 1937, President Roosevelt sent to Congress a message in which he advocated multiple-purpose river development in all of the nation's major watersheds,¹¹ and bills

⁹ This includes eight dams on the Tennessee River proper, and Norris and Hiwassee on tributaries.

¹⁰ United States Congress, *Investigation of the Tennessee Valley Authority*, Hearings before the Joint Committee on the Investigation of the Tennessee Valley Authority, 75th Cong., 3d Sess., pursuant to P.R. No. 83, Part 12, p. 5356.

¹¹ Seventy-fifth Congress, 1st Sess. *Congressional Record* LXXXI (Part 5), 5280-81.

TABLE 7

A COMPARISON OF THE AUTHORITY'S BASIC INDUSTRIAL RATE SCHEDULE WITH INDUSTRIAL-SERVICE SCHEDULES OF SELECTED UTILITIES, IN TERMS OF AVERAGE NET CHARGES IN CENTS PER KILOWATT HOUR *

| NAME OF UTILITY AND COMMUNITY SERVED | SCHEDULE DESIGNA- TION | TYPE OF SERV- ICE | BILLING DEMANDS (KILOWATTS) AND MONTHLY CONSUMPTION (KILOWATT-HOURS) | | | | | | | | | |
|--|------------------------------|-------------------------|---|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | | | 75 Kilowatts | | 150 Kilowatts | | 300 Kilowatts | | 500 Kilowatts | | 1000 Kilowatts | |
| | | | 15,000 KWH cents | 30,000 KWH cents | 30,000 KWH cents | 60,000 KWH cents | 60,000 KWH cents | 60,000 KWH cents | 120,000 KWH cents | 100,000 KWH cents | 200,000 KWH cents | 400,000 KWH cents |
| Tennessee Valley Authority through Florence Electric-ity Dept., Florence, Ala. | B-3 | MUL † | 1.50 | 1.08 | 1.36 | 0.91 | 1.19 | 0.79 | 1.11 | 0.72 | 0.99 | 0.66 |
| Alabama Power Co., Huntsville, Ala. | I | MRL ‡ | 2.02 | 1.42 | 1.79 | 1.27 | 1.64 | 1.15 | 1.56 | 1.07 | 1.44 | 0.95 |
| Buffalo Niagara Electric Corp., North Tonawanda, N. Y. | PSC-3 | MRL | 1.15 | 0.81 | 1.10 | 0.78 | 1.08 | 0.77 | 1.07 | 0.76 | 1.07 | 0.75 |
| Connecticut Light and Power Co., Willimantic, Conn. | 101 | MRL | 2.36 | 1.61 | 2.05 | 1.44 | 1.89 | 1.31 | 1.79 | 1.25 | 1.69 | 1.18 |
| Duke Power Co., Salisbury, N. C. | 2-C | MRL | 1.60 | 1.22 | 1.52 | 1.18 | 1.43 | 1.13 | 1.40 | 1.10 | 1.35 | 1.02 |
| Florida Power and Light Co., Sanford, Fla. | X-14 § | MRL | 2.79 | 2.08 | 2.61 | 1.99 | 2.52 | 1.76 | 2.34 | 1.64 | 2.07 | 1.50 |
| Illinois Iowa Power Co., Cairo, Ill. | 92 | MRL | 2.39 | 1.73 | 2.21 | 1.54 | 2.03 | 1.45 | 1.96 | 1.30 | 1.73 | 1.16 |
| Northern States Power Co., Mankato, Minn. | Ped-3 | MRL | 2.15 | 1.58 | 1.96 | 1.42 | 1.73 | 1.23 | 1.58 | 1.12 | 1.41 | 1.04 |
| Pennsylvania Power and Light Co., Columbia, Penn. | 184-P99 | MRL | 2.22 | 1.54 | 2.01 | 1.43 | 1.81 | 1.33 | 1.72 | 1.28 | 1.65 | 1.25 |
| Puget Sound Power and Light Co., Olympia, Wash. | TAR I III | MRL | 1.35 | 1.01 | 1.28 | 0.95 | 1.22 | 0.88 | 1.18 | 0.84 | 1.15 | 0.81 |

* Source: Compiled from Federal Power Commission, *Typical Net Monthly Bills, January 1, 1938*.

† MUL = Unrestricted lighting, in addition to unrestricted motive power.

‡ MRL = Unrestricted motive power and restricted lighting.

§ Average charges shown are for secondary service. Utility owns and maintains any necessary transforming equipment.

|| Utility owns and maintains any necessary transforming equipment, but energy is metered on primary side of transformer.

TABLE 8
COSTS OF BITUMINOUS COAL, BY DISTRICTS, IN
IMPORTANT COAL-PRODUCING AREAS,
F.O.B. MINES, 1934 *

| AREAS | TOTAL COST PER TON | |
|---------------------------------------|------------------------------|-----------------------------|
| | <i>Highest Cost District</i> | <i>Lowest Cost District</i> |
| Alabama | \$3.03 | \$2.07 |
| Southern Tennessee and Georgia..... | 2.22 | 2.12 |
| Northern West Virginia | 2.11 | 1.62 |
| Eastern Pennsylvania | 2.60 | 1.92 |
| Western Pennsylvania | 2.21 | 1.66 |
| Ohio | 2.00 | 1.69 |
| Indiana (deep and strip mines) | 1.72 | 1.33 |
| Illinois (deep and strip mines) | 1.72 | 1.37 |

* Source: National Recovery Administration, Division of Research and Planning, *Bituminous Coal Statistics*, pp. 1-3.

coal production costs presented in Table 8. The table suggests that steam electric stations located in the Warrior Coal Basin contend with coal costs that are higher than in many producing districts north of the Ohio River. Coal consumed in the Region has an added freight charge which ranged from \$0.90 to \$1.20 per ton during the summer of 1935. Many industrial areas outside the Region can secure coal at lower freight charges. The total delivered-to-customer cost of coal in the Region is therefore relatively high. These facts suggest that steam plants fueled with coal cannot give industries in the Region a power-cost advantage over industries in many other areas. For the present this unfavorable position with respect to coal is of decreasing importance. The Tennessee Valley Authority relies primarily on water-power facilities. Since the Region has in the center of its area the largest hydroelectric generating stations of the entire Tennessee Valley, it seems reasonable to expect that water power will long remain the most important, if not the only energizer.

Power and industry.—The abundance of power in the Region and the present low net charge for it, whether used for power, heat, or light, has been amply demonstrated. But such a favorable

power position, even though it be assumed to be permanent, will not of itself attract all manner of manufactures. Power is essential in all industries, but its cost importance in some industries is so small that their location is in no way influenced by it. Even for industry taken as a whole, the cost of power is of minor importance. This can be shown by simple calculations for the Region and for the Nation as a whole.

In 1929 the Region's industries had in their prime movers and electric motors an installed capacity of 43,000 horse power. This capacity is approximately 32,200 kilowatts. If an annual load factor of 30 percent is assumed, the consumption for the year was 84,620,000 kilowatt hours. At 1.75 cents per kilowatt hour, the power bill for the year was \$1,480,878, or 4.4 percent of \$33,489,000, the total value of manufactured products.¹⁶ For the nation as a whole the cost of power in 1929 was 2.1 percent of the value of manufactured products, as computed by the foregoing method.¹⁷

In many cases, then, the power-cost factor is not of primary significance in locating industry. But in the electrochemical and electrometallurgical industries, in which the power cost ranges between 10 and 25 percent of the total value of products,¹⁸ and in industries which require much power for breaking down raw materials mechanically, centers of cheap power exert the primary locating influence unless other factors are very adverse. It has been seen that the Region can at present offer exceptionally low power rates to such industries. The prospects for their attraction will be examined more fully through an analysis of contributory factors, especially the mineral raw materials, and the position of the Region with respect to them. To such an analysis the next section is devoted.

¹⁶ Compiled and calculated from the *Fifteenth Census of the United States: 1929. Manufactures*, III, 43-44. Holmes, *Plant Location*, pp. 103-4, used this method of computation.

¹⁷ Calculated from the *Fifteenth Census of the United States: 1929. Manufactures*, I, 16.

¹⁸ Curtis *et al.*, "TVA Estimates Favorable Costs for Concentrated Superphosphate," *Chemical and Metallurgical Engineering*, XLIII (December, 1936), 649; National Recovery Administration, "Report on the Aluminum Industry," p. 22.

MINERAL RAW MATERIALS

The Region does not appear to be a favorable area for the assemblage and conversion of large volumes of mineral raw materials. This is so because the industrially important mineral raw materials within the Region or immediately adjacent to it are either of low quality and insufficient reserve, or their location is such that they can be assembled more economically elsewhere. Large-scale industries located here on the basis of mineral raw materials, therefore, appear under the present state of technology to be poorly placed. Whatever competitive advantage the Region has for processing mineral raw materials lies in the cheapness of electric power for the reduction of certain minerals and common rocks. An appraisal of the mineral raw-material situation will make clear the deficiencies and will disclose opportunities for further development. The mineral raw materials considered are the brown iron ores, phosphate rock, bauxite, limestone, asphalt rock, and clay.

The brown iron ores.—The brown iron ores which may be considered tributary to the Region are located in two districts. The first is at Russellville, Alabama, and is known as the Russellville District.¹⁹ It comprises an area of about twenty-five square miles and lies by railroad about twenty miles south of the tri-city center. The second district comprises the brown iron ore deposits of the Western Highland Rim of Tennessee. This is a north-south belt extending from Kentucky through central Tennessee to the Alabama state line. The western margin of this north-south belt lies from fifteen to forty-five miles east of the Tennessee River, and in general parallel to it.²⁰ The southern portion of this ore belt may be regarded as definitely tributary to the Region.

During the period of industrial promotions the ores of these districts were looked upon as the basis for a gigantic iron industry, thought to be at that time in its infant stage. The failure of this industry to meet expectations and its ultimate disappear-

¹⁹ Burchard, *The Brown Iron Ores of the Russellville District, Alabama*, p. 152.

²⁰ Burchard, *The Brown Iron Ores of the Western Highland Rim, Tennessee*, p. 24.

ance from the Region were noted at an earlier point (Table 2). Periodically, however, claims were made while the industry was still functioning that responsible interests were ready to expand it, and since 1930 there have been occasional rumors that the industry was about to be revived. During the Ford episode there was much talk about the making of steel by electric-furnace methods. The promoters pictured a "considerable battery of electric furnaces," fed by pig iron from existing blast furnaces.²¹ Even as late as 1934 it was asserted that industrialists from the North had been down that year to examine the possibilities of reviving the industry. But such revival seems doubtful.

The weakness of the iron industry in the Region lay in its inability to compete with the near-by Birmingham iron and steel district.²² The major contrasts between the Region and Birmingham, in their qualifications for an iron industry, suggest the difficulties the Region faced: (1) Birmingham always had easy access to coking coal. The Region had to import its coking coal from the Birmingham district or from other areas. But large iron and steel centers prevail elsewhere which bring in coke from even greater distances. The lack of coke, therefore, was not a primary obstacle, but it added to the unfavorableness of the location. (2) The Region at no time had marketing advantages over Birmingham and, as the southern rail net evolved, Birmingham became a traffic junction, thereby progressively improving its marketing facilities over those of the Region. These advantages in tapping markets Birmingham has been able to maintain. (3) Birmingham has from the first been able to draw on its near-by and immense reserves of iron ore, which are suitable in quality and adapted to large-scale shaft mining. The iron industry of the Region depended on ore supply of scattered occurrence, poor in quality, and of low reserve. Such ore deficiency was the most significant handicap.²³

²¹ *Christian Science Monitor*, Aug. 23, 1922.

²² Letter from Sloss-Sheffield Steel and Iron Company, Jan. 19, 1937.

²³ Russell Hunt, Vice President of the Sloss-Sheffield Steel and Iron Company, "Southern Iron in 1930" (unpublished article): "But why the wholesale furnace demise at so many Southern points outside of Birmingham? We do not believe the economic changes following the Great War caused it; this only hastened it. The

The brown iron ores tributary to the Region are so scattered and occur under such varied conditions that no uniform large-scale mining technique is possible. But such techniques are necessary, even for a moderate-sized iron industry, if ample ore supplies at low cost are to be assured. The ores occur in pockets of varying extent, both laterally and vertically. Some of the pockets are so small that they contain but a few truck loads of ore, while others are large irregular bodies ranging to depths of a hundred feet and extending over hundreds of acres. Some of the largest deposits originally held 1,000,000 tons of ore for strip mining by steam shovel, but the richer portions of such deposits have already been mined.²⁴ That the great lateral and vertical variability of ore pockets precludes planned and large-scale mining is indicated by the saying common in the brown ore districts that "no one has much knowledge of a brown ore 'bank' beyond the length of his pick."²⁵ Putting expensive and large-scale equipment into operation with such an uncertain ore supply is a risk no company is likely to take, as long as larger ore reserves of more uniform quality are equally accessible.

The iron ore of the ore pockets is embedded in waste materials of clay, chert, sand, and gravel. This waste material often makes up the bulk of the deposit. In the richer deposits it takes from two to three cubic yards of dirt to yield one ton of ore, while the poor deposits may require as much as twelve to sixteen cubic yards for one ton of ore. Since the waste substance can be removed only by washing after the dirt has been mined, much material has to be handled for every ton of ore finally obtained.²⁶ Inasmuch as the best ore pockets have already been mined, future

real reason lies in the raw materials, or rather the lack of them. As the rich banks or pockets of ore were gradually exhausted, the operators found it increasingly difficult to secure sufficient ore of good quality and low cost to make iron at a cost that could compete with the more favored Birmingham District; and the last straw came when the Birmingham furnaces built by-product coke ovens."

²⁴ Burchard, *The Brown Iron Ores of the Russellville District, Alabama*, p. 155; Burchard, *The Brown Iron Ores of the Western Highland Rim, Tennessee*, pp. 24-25.

²⁵ Phillips, *Iron Making in Alabama*, p. 78.

²⁶ Burchard, *The Brown Iron Ores of the Russellville District, Alabama*, p. 156; Burchard, *The Brown Iron Ores of the Western Highland Rim, Tennessee*, p. 215.

undertakings will have to handle ores with increasing proportions of gangue. The cost of beneficiation will mount accordingly and may prove prohibitive to further mining unless more efficient methods for beneficiating the ore are discovered.²⁷

The cleaned and concentrated ore has an iron content that is adequate. Ores from the Tennessee belt, as prepared for blast furnaces, average an iron content of about 45 percent. Insoluble materials such as alumina and silica make up 25 percent. Other constituents are about 10 percent of combined water, phosphorus generally between 0.3 and 0.5 percent, and manganese usually between 0.2 and 0.5 percent.²⁸ Ores from the Russellville District prepared for the blast furnace, appear to have a slightly higher iron content, but otherwise they are similar in composition. These ores benefit greatly from an admixture of hard red ore from Birmingham.²⁹

The difficulty of assessing the ore reserves under conditions of occurrence as outlined above can readily be appreciated. Some authorities on the brown ores, after prolonged study, have hesitated to present any reserve estimates.³⁰ The figures given here are those of Burchard, of the United States Geological Survey, who has made the most detailed study of the deposits. He estimates that the Western Highland Rim of Tennessee has 9,400,000 tons of ores "probably available now or in the near future" and 5,100,000 tons which are "not available except in the distant future." About 6,000,000 tons of the available ore lie in the southern portion of the belt, immediately adjacent to the Region. For the Russellville District recent data obtained through intensive field surveys are now being compiled and are therefore not available for use in this study. For that reason reliance must be placed on reserve estimates made at an earlier date. These credit the district with an estimate of 17,300,000

²⁷ Burchard, *The Brown Iron Ores of the Western Highland Rim, Tennessee*, p. 216.

²⁸ *Ibid.*, p. 27.

²⁹ Burchard, *The Brown Iron Ores of the Russellville District, Alabama*, pp. 27, 159.

³⁰ Phillips, *op. cit.*, p. 89.

tons "probably available" and about 7,700,000 tons "at present non-available."³¹ Thus the total of available ore which lies in areas that may be regarded as tributary to the Region equals about 27,000,000 tons. Such a reserve tonnage would be adequate as the basis for a small iron industry, if the question of an iron center hinged entirely on the amount of ore present. But an industry of the size centered in the Birmingham district of Alabama would exhaust the supply in a decade.

The iron-ore supply tributary to the Region may therefore be summarized as scattered in distribution, greatly variable in size and richness of ore pockets, low in quality, and small in reserve when considered in the light of present-day consumption rates. These limitations appear to preclude the revival in the Region of an iron industry based on near-by ores.

There remains for consideration an iron and steel industry based on the electric furnace for reduction of iron ore, for the making of steel from metallic charges, and for the production of ferro-alloys. From time to time this has been suggested for the Region as a way to new industries. The Region's abundant and cheap electric energy has been held out as the primary advantage, though the iron ores available near-by would supposedly add to the favorableness of the location. With the industry located near the power dams and adjacent to the Tennessee River, the ores of the Russellville District and those of the southern portion of the Tennessee Belt would be equally accessible. Some light may be thrown on the economic-geographic validity of such a location by an examination of the present distribution of electric furnaces functioning in the iron and steel industry.

No pig-iron production in the United States is credited to the electric furnace and it does not now appear that this method of iron ore reduction will be used for many years to come, even if exceptionally low energy rates prevail.³² But in high-grade steel production the electric furnace is assuming importance. In 1935 the annual capacity of all steel-making electric furnaces in the

³¹ United States Congress, Hou. of Reps., *Tennessee River and Tributaries*, p. 119.

³² National Resources Committee, *Technological Trends and National Policy*, p. 358.

United States was reported at 1,424,000 tons. Of this total Michigan alone had 31 percent, of which 24 percent could be credited to Dearborn and the remaining 7 percent to Detroit. Pennsylvania had 24 percent in 17 different centers, and Ohio had 22 percent with a strong concentration in Canton. Two states with lower capacities, but still important were New York with 8.4 percent and Illinois with 6.5 percent.³³ This distribution appears to be almost entirely determined by the location of the existing industries in which the electric furnace is made to function. For example, the Ford Motor Company has introduced the extensive use of alloy steel castings.³⁴ To assure complete control of the process, the electric furnace is used. The large demand requires volume production and it has easily put Dearborn in first place. In Pennsylvania the electric furnace has been linked with existing iron and steel centers, and in New York it is associated with centers requiring high-grade steel, such as Syracuse³⁵ and Watervliet.

The indicated distribution suggests that cheap electric power has not yet become the primary factor attracting the electric steel-making furnace, and that it may not be expected to become such a factor until a much larger proportion of the total steel output is made by this method. Existing iron and steel industries have added the electric furnace as a minor adjunct to their production technique. Since the Region does not have such a basic iron and steel industry and is not likely to revive it, the electric steel-making furnace here would appear to be poorly placed.

The distribution of the electric furnace for the production of ferro-alloys presents a different picture. Fourteen electric furnaces contributed two-fifths of the ferro-alloy production in the United States in 1935.³⁶ The capacity data of these electric fur-

³³ Compiled from the *Directory of the Iron and Steel Works of the United States*, 22d ed. (1935).

³⁴ "Ford's New Facilities for Casting Alloy Steel," *Iron Age*, CXXXVII, (April 30, 1936), 22-25.

³⁵ The Crucible Steel Company of America and the Halcomb Steel Company produce high speed steel, high carbon steel, resisto steel, and some alloys. Letter from Syracuse Chamber of Commerce, June 8, 1938.

³⁶ Letter from John W. Finch, Director, Bureau of Mines, United States Department of the Interior, Aug. 4, 1937.

naces is too incomplete to use for distribution study. But the location of the furnaces clearly shows that this industry is in many instances linked to points of cheap hydroelectric power. Out of fourteen furnaces, nine were located at hydroelectric sites and of these nine, four were at Niagara Falls. From such a national distribution it may be deduced that the Region, which has large blocks of undeveloped secondary power at existing dams, should be regarded as one of the more favorable places for a ferro-alloy industry.

That the Region is sufficiently attractive for such industry is indicated by the announcement of the Electro Metallurgical Company, a subsidiary of the Union Carbide and Carbon Company, that a plant site had been acquired adjacent to the tri-city center. On this site electric furnace equipment was erected, which is designed for the manufacture of ferro-alloys. During March, 1939, spur lines were laid into the plant site and the erection of the plant equipment was undertaken during the summer months of 1939.

Phosphate rock.—Since 1934 phosphate rock has assumed some importance as a mineral raw material for industry in the Region. It is being used in the manufacture of concentrated superphosphate. This processing is being done by the Tennessee Valley Authority, which has for that purpose converted part of Government Plant Number 2 near Wilson Dam into a unit where the rock is being reduced in electric furnaces. This activity is being carried on in compliance with those sections of the Act which direct the Authority "to improve and cheapen the production of fertilizer . . . at Muscle Shoals by the employment of existing facilities, by modernizing existing plants, or by any other process or processes that in its judgment shall appear wise and profitable . . . and to make donations or sales of the product of the plant or plants . . . for experimentation and education."³⁷

The raw materials required to produce phosphoric acid by the electric-furnace method are phosphate rock, silica pebble, and coke. But such raw materials could be assembled more economically if the plant were located in the phosphate fields. A pro-

³⁷ *United States Statutes at Large*, XLIX (Part 1), 1077-78.

duction cost analysis by the Authority's chemical engineers demonstrates what the economies for such a location would be, under conditions such as prevailed in 1936. Of the raw materials, the largest single item in tonnage consumption is phosphate rock. The proportions are one ton of coke and 1.6 tons of silica pebble for every 5.4 tons of phosphate rock. For a plant located near Wilson Dam, the phosphate rock is hauled by rail from the deposits of south-central Tennessee, carrying a freight charge of \$1.47 per ton. The silica pebble is brought from Iuka, Mississippi, carrying a handling charge of \$0.40 per ton, and the coke comes from Birmingham at a freight charge of \$1.92 per ton.³⁸

If, on the other hand, the raw materials are assembled at a point in the phosphate fields of south-central Tennessee, the freight charge on the raw phosphate is eliminated. But a switching charge of \$0.10 a ton is incurred, thus netting a saving of \$1.37 per ton of rock handled, or \$4.70 per ton of available P_2O_5 in the superphosphate. For such a location silica pebble need not be purchased, because lump phosphate or sinter carrying sufficient silica is used for the furnace charge. Elimination of separately purchased silica pebble results in a saving of \$0.76 per ton of available P_2O_5 in superphosphate. Owing to the peculiarities of the freight rate structure, coke is taken to a location in the phosphate fields at a freight charge saving of \$0.16 per ton, or \$0.07 per ton of available P_2O_5 in the superphosphate. The total savings in raw-material requirements and assemblage would be \$5.53 per ton of available P_2O_5 . This saving, however, would be partly offset by increased power costs due to an increase in costs of transmitted power and a demand charge on secondary power. The schedule of the Tennessee Valley Authority which applies to the case would result in a power-cost increase of \$2.07 per ton of available P_2O_5 in the superphosphate. Deducting the power-cost increase from the savings in raw material assemblage leaves a net saving of \$3.46 per ton of available P_2O_5 , or a reduction of 7.2 percent in the net production cost.³⁹

³⁸ Curtis *et al.*, "TVA Estimates Favorable Costs for Concentrated Superphosphate," *Chemical and Metallurgical Engineering*, XLIII (1936), 647.

³⁹ *Ibid.*, p. 650.

In the past all plants processing the phosphate rock of south-central Tennessee have been located in the phosphate fields. But those plants did not use electrolytic reduction, the method in which electric energy is an important cost factor. But even if the electric furnace comes into more extensive use in the manufacture of concentrated superphosphates, the phosphate rock area remains the most economical site for the industry under the Authority's prevailing industrial power rates.

The phosphate fields have already attracted such plants. The construction of a large electrolytic reduction plant near Columbia, Tennessee, was undertaken in 1936 by a chemical company which has had years of experience at Anniston, Alabama, with the electric furnace method. Since the completion of the plant near Columbia, Tennessee, a second chemical company has erected an electrolytic reduction plant near Mount Pleasant, Tennessee. The Tennessee Valley Authority supplies the power in both instances.⁴⁰

Phosphate rock from south-central Tennessee will continue to move to the tri-city center, where the Tennessee Valley Authority is exploring new and better methods of fertilizer production.⁴¹ To do so the Authority has to operate the plant on a large enough scale so that results can be commercially applied. But beyond this demonstration scale, during peace time at least, it would be uneconomic to produce. It does not appear, therefore, that the Region will attract an important mineral and chemical industry based on phosphate rock derived from the mines of south-central Tennessee.

Bauxite.—Deposits of low-grade bauxite are found in the western part of the Region, near Margerum, and in the north-eastern part of the state of Mississippi.⁴² The bulk of the known ore is in the Mississippi area and is estimated at 3,000,000 tons. At some future date it may be used in the manufacture of alumina

⁴⁰ Tennessee Valley Authority, *Annual Report, June 30, 1936*, pp. 195-205; *Annual Report, June 30, 1938*, pp. 333-39.

⁴¹ Tennessee Valley Authority, *Annual Report, June 30, 1936*, pp. 25-44.

⁴² Walter B. Jones, "Bauxite in Alabama with Special Discussion of the Margerum District," *Economic Geology*, XXI (Dec., 1926), 792-802; Burchard, *Bauxite in Northeastern Mississippi*, pp. 101-46.

cement. For the manufacture of such a commodity an economical method is already claimed.⁴³

The above-named bauxite deposits cannot at present be regarded as suitable ores for the making of aluminum. This fact will be better understood if the major processing steps of the aluminum industry are outlined. After the ore has been mined, milled, and dried, it undergoes chemical treatment to extract alumina, the oxide of the metal, from impurities. The alumina undergoes electrolytic reduction to aluminum, after which the aluminum is ready for fabrication. The ores of the Region and those of contiguous areas do not measure up to requirements for economical chemical treatment. Their deficiency lies in a high content of impurities, which for the bulk of the ore is equal to an iron content of from 5 to 35 percent and a silica content of from 10 to 35 percent.⁴⁴ In the chemical treatment of the ore, the Bayer process is used in the United States, and in that process silica is a particularly troublesome impurity. The raw materials in this process are, in addition to bauxite, soda ash, and quicklime. Silica is so troublesome because the amount of soda ash and quicklime needed in the ore treatment increase in direct proportion to the silica content. In addition, each pound of silica carries with it a pound of alumina to be wasted in the mud. The acid process of ore treatment involves other difficulties, but it is equally unsuited to the ores of the Region and contiguous areas. The acid dissolves the iron with the alumina. And there is no economical method for separating the alumina from the iron in such acid solutions, to get aluminum oxide of desired purity. As long, therefore, as high-grade bauxites are economically available elsewhere, or until a better method of alumina extraction is discovered, the low-grade ores of the Region and the Mississippi area will not be used for aluminum production.⁴⁵

⁴³ Eckel, "Utilization of Mississippi Low-Grade Bauxites," *Manufacturers Record*, CIV (Feb., 1935), 48.

⁴⁴ Burchard, *Bauxite in Northeastern Mississippi*, p. 113; Jones, "Bauxite Mining in the United States—Alabama," *Mining and Metallurgy*, XV (Dec., 1934), 482.

⁴⁵ "Why High-Grade Ores Are Used for Aluminum Manufacture," *Engineering and Mining Journal*, CXXXVII (Sept., 1936), pp. 460-61.

Efforts have been made in recent years to locate an aluminum industry in the Region.⁴⁶ From the facts presented in the foregoing paragraph, it is clear that it is not the presence of low-grade bauxite deposits that has induced such attempts. It is rather the position of the Region with respect to the national flow of bauxite and alumina and the fact that it has abundant and cheap electric energy, so essential for the reduction of alumina to aluminum. So important is the power factor that the Aluminum Company of America has located all its electrolytic reduction plants at points of cheap electric energy, even though the bauxite ore fields are situated at a distance of from one to several thousand miles. The plants of the Aluminum Company are located at Massena and Niagara Falls, New York; Baden, North Carolina; and Alcoa, Tennessee. At each of these points hydroelectric power is supplied, either by the company's own plants situated near-by, or by others under long-term leases. The bauxite used for aluminum production in the United States comes from Arkansas and from Dutch and British Guiana. In the movement of bauxite from the ore field toward the electrolytic reduction plants, alumina is extracted at the first convenient point, resulting in a 50 percent tonnage reduction. Formerly, East St. Louis, Illinois, was the only ore-treatment center. In 1937, however, the construction of an ore-treatment plant was undertaken at Mobile, Alabama, and has since been completed. This plant is designed to treat much, if not all of the Guiana ore, and from there the alumina is shipped directly to the electrolytic reduction plants.

In the present set-up of the aluminum industry, the Region feels it is well situated for a reduction and fabricating plant. It can, in the first place, point to the attractive Tennessee Valley Authority power rate schedule. The raw materials for carbon blocks can be brought together economically. Alumina can be sent from either ore treatment plant without incurring high freight charges. Labor is available at an attractive price and is competent. But there are also obstacles. The Aluminum Company of America has a large reduction and fabricating plant near-by,

⁴⁶ *The New York Times*, July 25, 1936.

at Alcoa, Tennessee. To locate a plant in the Region would be a duplication of facilities in the same general locality.

It might be argued that a plant of a competing firm should be established. But a new company would consider carefully before entering into competition with a firm so well entrenched. It is also held that a new firm would have the problem of finding an "adequate supply of high-grade bauxite available in the open market."⁴⁷

The situation is, then, one in which the Region, though qualified as a center for an aluminum plant, faces organizational obstacles in the existing industry that will have to be met before it can profit by its qualifications.

Limestone.—The building limestones of the Russellville District have been the basis for an intermittent stone-quarrying and milling industry during the past half century. Although this industry began as early as 1880, when stone was finished for Alabama University buildings,⁴⁸ it has always remained small. The present facilities consist of several quarries in operating condition and three finishing mills. One of the mills is located in Russellville and the remaining two are at Rockwood. One of the Rockwood plants is a large steel-framed structure housing modern stonecutting and carving machinery, all of which is electrically driven. The three mills were active during the late 1920's, but all stood idle during the summer months of 1935.

The building limestone of the Russellville District compares favorably in quality with that of Kentucky and Indiana. It stands up well under weathering and retains its color.⁴⁹ But in quarrying the stone, conditions are often met which make for uneconomic operation. Cracks and solution channels may be encountered, resulting in a high percentage of bad blocks. In the rolling and rugged parts of the district, heavy overburden is an obstacle after the quarry has been extended laterally a short distance. At other points the stone is excessively hard, and at still other places the

⁴⁷ National Recovery Administration, "Report on the Aluminum Industry," p. 5.

⁴⁸ Walter B. Jones, *Summary Report on the Building Limestones of the Russellville District*, p. 8.

⁴⁹ *Ibid.*, pp. 21-22.

thickness of rock is inadequate for economical quarrying operations. Thus, out of ten quarries examined in 1928, six were found to have been abandoned owing to one or several of the handicaps indicated above. Of the remaining four, two were operating successfully and two were being developed.⁵⁰

The intermittent and small production in the past, the quarrying difficulties, and the remoteness of large markets for the milled stone are facts which lead to the conclusion that the Region cannot count on the limestone milling industry to contribute more to manufactures than it has in the past.

Asphalt rock.—Limestones and sandstones impregnated with bitumen, and therefore known as asphalt rock, occur within the Region. Extensive outcrops are found in Colbert, Lawrence, and Morgan Counties.⁵¹ The reserves one mile back from the outcrop zone and covered with less than fifty feet of overburden have been estimated at more than a billion tons.⁵² Actual mining of the rock on a commercial basis is confined to Colbert County. The mined rock is used for highway and street surfacing. For that purpose it has to be processed, but this is a simple operation. The stone is mixed for uniform bitumen content and then pulverized to such a degree of fineness that it can be reunited and compacted by cold rolling.

Production of asphalt rock in the Region began in 1923, but the output has always remained small. It has to compete for a marketing area with similar rock produced in seven other states. It also faces keen competition from cheaper road-building materials.⁵³ And even with an increase in the volume of production, no great industry will result. Preparing the material for road surfacing is such a simple process that large tonnages can be run through moderate-sized plants, engaging only a few workers. Asphalt rock, therefore, plays only a very minor rôle as a raw

⁵⁰ *Ibid.*, pp. 24-36.

⁵¹ Clark, *Rock Asphalts in Alabama and Their Uses in Paving*, p. 12.

⁵² Walter B. Jones, *Summary of the Distribution and Occurrence of the Rock-Asphalt Deposits of Alabama*, pp. 18-19.

⁵³ United States Department of the Interior, Bureau of Mines, *Minerals Yearbook*, 1936, p. 872.

material for industry, and this position it probably will continue to hold.

Clay resources.—Industries based on the clay resources of the Region comprise one small pottery and two brick and tile manufacturing plants. The pottery, located at Spruce Pine, draws its supply of clay from a small deposit located within one mile of the factory. Pottery clays of high quality and abundance, however, are available in several localities in Franklin and Colbert Counties.⁵⁴ The brick and tile plants located at Decatur formerly drew their clay supply from the flood-plain clays of the Tennessee River. These beds are now covered by the waters of Wheeler Reservoir, but ample floodplain clays are said to be available along tributary streams in the area. Brick production in the Region has been limited by market restrictions. Common brick is a bulky item and incurs excessive freight charges if shipped for a distance. Furthermore, clays suitable for brick-making are widespread, so that plants can be established in accordance with local needs. The brick and tile industry of the Region can expand as soon as local needs for its products increase enough to warrant it.

Summary.—The foregoing picture of the mineral resources and the industries that are or can be based on them is not greatly encouraging. To those who are accustomed to measure the possibilities of such industries only in terms of the variety of mineral resources that can be listed for the Region, this analysis will appear unduly pessimistic. They forget that modern industry is compelled by its large-scaled mechanized operations to focus attention on mineral deposits of large reserve and uniform quality, if it is to supply commodities derived therefrom at low cost. Such mineral deposits the Region does not have, and for deposits in contiguous areas it is not generally a focal point for economical assemblage. Certain common rocks the Region has in abundance. But they are bulky and are widely distributed in many parts of the nation. The manufactured product of such rocks is therefore

⁵⁴ United States Congress, Hou. of Reps., *Tennessee River and Tributaries*, p. 167.

confined to near-by markets, and if the market in the local area is small the rock industries remain small.

THE INDUSTRIAL WATER SUPPLY

The industrial water supply of the Region is abundant, of good quality, and can be made available at low cost. While such supply will not attract industry, its lack could be a very important factor checking industrial growth. For example, Akron, Ohio, situated on the divide between streams flowing to Lake Erie and to the Ohio River, saw its growing rubber industry use the available water supply practically to the limit as early as 1919. This inadequate actual and potential supply of industrial water for a rapidly growing industry was one of the important factors compelling rubber concerns to look for plant locations elsewhere.⁵⁵ The mounting engineering problem of securing an additional supply of domestic and industrial water for cities like Los Angeles and New York is well known. Such problems of water supply the Region will never experience, for other factors will exert a limiting influence before a shortage in the water supply will be felt.

The supply of ground water.—The Region's most important present source of industrial water is the large store of ground waters. The heavy and dependable rainfall and the porous mantle and bed rocks are of basic importance in assuring a continuing supply.

The average annual rainfall, as recorded by stations located at Florence and Decatur, is fifty inches. This rainfall is sufficient to return annually large volumes to the ground water supply. Table 9 shows that the amount of rainfall is fairly uniform from year to year. This assures uniform replenishment of the ground water supply and results in a comparatively steady flow from the Region's giant springs.

The permeable mantle and bed rock allow the rain water to percolate downward rapidly, to be stored in the extensive limestone aquifers of the Region. The limestone formations are riddled with cracks and solution channels, and these large voids

⁵⁵ Allen, *The House of Goodyear*, p. 226.

TABLE 9
ANNUAL RAINFALL OF TWO STATIONS IN THE REGION *

| YEAR | FLORENCE | DECATUR |
|------------|----------|---------|
| 1911 | 66.3 | 64.8 |
| 1912 | 61.6 | 61.3 |
| 1913 | 47.2 | 44.3 |
| 1914 | 38.7 | 39.3 |
| 1915 | 46.8 | 42.0 |
| 1916 | 56.9 | 45.1 |
| 1917 | 51.9 | 51.4 |
| 1918 | 53.2 | 43.1 |
| 1919 | 62.2 | 63.1 |
| 1920 | 68.3 | 51.5 |
| 1921 | 51.0 | 42.4 |
| 1922 | 57.4 | 51.5 |
| 1923 | 61.6 | 59.7 |
| 1924 | 42.5 | 46.3 |
| 1925 | 44.9 | 36.2 |
| 1926 | 52.8 | 50.9 |
| 1927 | 57.0 | 48.9 |
| 1928 | 52.1 | 60.1 |
| 1929 | 62.0 | 59.8 |
| 1930 | 47.9 | 37.9 |

* Source: United States Department of Agriculture, Weather Bureau, *Climatic Summary of the United States, Section 100, Northern and Western Alabama*, pp. 7-8.

give the rock great water storage capacity and facilitate water movement.⁵⁶

Recovery of the ground water for industrial purposes is effected by tapping large springs and drilling wells into the water-bearing horizons. All of the industries in the Huntsville center draw their water either from magnificent springs, or from shallow large-volume wells. A spring supplies the stone-milling industries of Rockwood and one of the asphalt rock mills draws its water from a similar source. A number of fine and accessible springs in the Region have only a small fraction of their daily flow utilized.

The supply of surface water.—The surface waters of the

⁵⁶ Johnston, *Ground Water in the Paleozoic Rocks of Northern Alabama*, pp. 178-82, 215, 249-52, 256-59, 263-65, 270-74, 292-95.

Region constitute a second source of supply for industrial uses. This source of supply is, from a practical viewpoint, inexhaustible, because of the large volume made available by the Tennessee River. Such cities as Decatur and Sheffield are wholly dependent on this source of supply.

Tennessee River water is at all times turbid. The reservoirs of the river act as settling basins for the coarse materials, but much finely divided material remains in suspension. This has to be removed by filtration or chemical treatment, in order to render the water satisfactory for most industrial purposes. From that standpoint, however, the Tennessee River is no exception, since a large proportion of the nation's river waters has to undergo similar treatment.⁵⁷

Pollution of the industrial water supply from industrial wastes is a critical problem in many industrial areas. But in the Region such difficulty does not prevail. The nearest industrial city upstream is Chattanooga, about 150 river-miles away, and the waste-carrying waters emitted by its industries are of negligible importance when considered in relation to the great volume of the Tennessee River.

The water of the Tennessee River is relatively free from elements carried in solution. Samples for analysis were taken at weekly intervals during the period from November, 1936, through October, 1937, near Decatur, Alabama, and 2.7 miles below Wilson Dam. These analyses show that the water is soft, with an average hardness of 63 and 64 p.p.m. respectively.⁵⁸ This is significant, since many industries require soft water for their successful operation. Among these may be listed textiles, paper mills, glue factories, sugar refineries, starch works, canning factories, chemical industries, and tanneries.⁵⁹ Such industries, other things being equal, will select communities that can offer an abundant supply of soft water.

Summary.—This brief survey of the industrial water supply

⁵⁷ Collins, *The Industrial Utility of Public Water Supplies in the United States*, p. 19.

⁵⁸ Tennessee Valley Authority, *Industrial Water Resources of the Tennessee Valley*, pp. 1-4.

⁵⁹ Hoover, *Water Supply and Treatment*, pp. 69-70.

has shown that abundant water of a high degree of purity can be obtained in the Region, and that such supplies are not confined to the Tennessee River, for ground waters of satisfactory quality are widely available.

AGRICULTURAL RAW MATERIALS

The power and mineral resources of the Region and the industries which are or can be based on them have been examined. Other industrial resources are to be found in some products of agriculture and in the Region's forests. In this and the succeeding section attention will be directed to these two sources of raw materials.

Climate, topography, and soils.—The Tennessee Valley of northern Alabama has long been recognized as an area of great agricultural potentialities. More than a hundred years ago it was characterized in the following glowing terms by the geographer Ebenezer Cummins:

The northern parts of Alabama consist of the valley of the Tennessee.... This undoubtedly is one of the most beautiful and desirable countries in the United States; being in the region of health, and having a climate of most delicious temperature, good water, and abundantly productive lands.⁶⁰

In 1870 Somers considered it "‘a land of Goshen’ where every product of the soil may be grown and cultivated with rare success, where cattle may be reared and made fat and tender, and the produce of the dairy may contribute no unimportant item to the resources of the farm."⁶¹ Two decades later McCalley pictured the rolling Red Lands flanking the Tennessee River as "the garden spot of Alabama."⁶²

The power to produce abundantly from the land is still an attribute of the Region. This power rests basically on a favorable combination of climate and weather, topography, and soils.

The Region is favored with sufficient rainfall. The annual

⁶⁰ Cummins, *A Summary Geography of Alabama*, p. 12.

⁶¹ Somers, *The Southern States since the War*, p. 113.

⁶² McCalley, *The Valley Regions of Alabama, Part I, The Tennessee Valley Region*, p. 13.

amount at Decatur, Alabama, over the fifty-year period 1881 to 1930 ranged between a low of 34.7 inches in 1904 to a high of 64.8 inches in 1911. Out of the fifty years, thirty-seven had rainfall of more than 40 inches and less than 55. The seasonal distribution results in a spring and early summer maximum, while the months of August, September, and October coincide with the period of least rainfall. No distinct dry period, however, is experienced. The autumn months have, on the average, from 25 to 30 percent less rainfall than the monthly average for the year.⁶³ The fall minimum is desirable because it promotes the maturing of crops and allows more favorable harvesting conditions. The distribution of rainfall during the growing season is usually uniform enough to prevent any acute drought. Slightly excessive rainfall or slightly subnormal rainfall for ideal crop production is common, however, and causes minor year-to-year variations in the yield and quality of crops. Heavy downpours, accompanied by strong winds, also damage crops at times.

The growing season at Decatur for the thirty-five-year period 1896 to 1930 ranged from a low of 186 days in 1910 to a high of 254 days in 1902. Only the year 1910 experienced a growing season of less than 200 days. The growing season at Florence for the period 1896 to 1930, with no record for 1914, ranged between a low of 164 days in 1909 to a high of 262 days in 1896. During that period the Florence station recorded seven years with a growing season of less than 190 days. The last killing frost in spring occurred between the dates March 15 and April 15 73 percent of the time, while the first killing frost in autumn occurred between October 15 and November 15 78 percent of the time. For most of the lowlands of the Region the growing season, therefore, is 200 days or more.⁶⁴ Plants which require a growing season of 90 days can thrive side by side with those requiring 180 days to reach maturity. The Region is the meeting ground of middle latitude and subtropical crops.

Temperatures during the four warmest months generally range

⁶³ United States Department of Agriculture, Weather Bureau, *Climatic Summary of the United States, Section 100—Northern and Western Alabama*, pp. 7-8.

⁶⁴ *Ibid.*, p. 15.

between 60° F. and 100° F. The day-to-day summer temperature conditions and the daily maximum and minimum are shown for Florence and Decatur in Figure 7. Such temperature conditions promote efficient plant growth.

Sunshine records for the Region are not available. Records of near-by stations such as Birmingham, Alabama,⁶⁵ suggest that the Region has sunshine from 55 to 70 percent of the total time possible during the growing season. This is ample for rapid plant growth.

The soils and the topography of the Region cannot be rated as favorably as the climate in facilitating the production of agricultural raw materials. Some parts of the Region are too rugged for cropping purposes and for plow agriculture. In other places the soil is too poor, or drainage is inadequate. After all areas unsuited to cultivation have been eliminated, there remains an estimated 72 percent of the land area which may be classed as arable.⁶⁶ The extent of arable land varies from place to place in the Region. Its distribution and character can best be presented in terms of the soil and topographic characteristics of the Region.

The more prominent topographic and soil areas of the Region are designated in this study as (1) Red Lands, (2) Barrens, (3) Little Mountain, (4) Moulton Valley, (5) Inner Coastal Plains, and (6) Cumberland Plateau (Fig. 4).

The most favorable area for agriculture, viewed from the standpoint of topography and soils, is the section referred to as the Red Lands. This section flanks the Tennessee River flood plains on both the north and south sides of the stream. Its width on the south side of the river ranges up to ten miles. On the north side of the river the section is from ten to twelve miles wide in the

⁶⁵ *Ibid.*, p. 14.

⁶⁶ The estimate of arable land was made by the United States Bureau of Chemistry and Soils and is based on the average of soil types listed in the soil surveys of the counties comprising the Region. The estimates "represent the rounded figure of total acreage of the soil types that have been considered to be potentially arable land, provided they were cleared and given proper soil management including terracing for the more sloping lands and drainage for those soils most readily reclaimed." Letter from J. Kenneth Ableiter, Senior Soil Technologist, United States Department of Agriculture, Bureau of Chemistry and Soils, Aug. 31, 1938.

western part of Madison County and the eastern part of Limestone County, but in Lauderdale County it narrows greatly or disappears entirely. The east-west extent of the Red Lands is from the base of the Cumberland Plateau on the east to within about five miles of the Mississippi state line on the west.

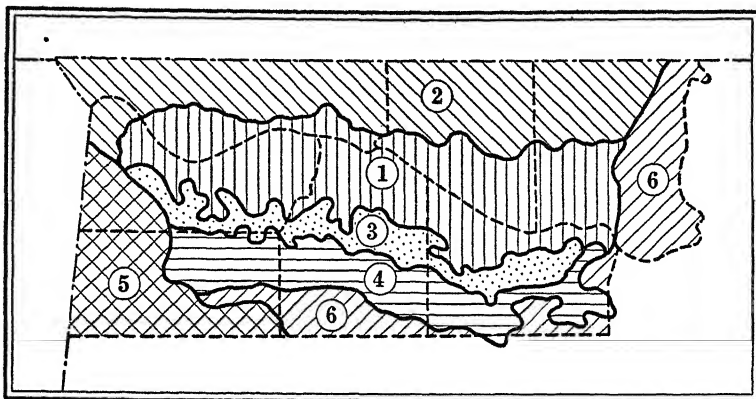


FIGURE 4

THE TOPOGRAPHIC AND SOIL AREAS OF THE REGION. THESE INCLUDE (1) THE RED LANDS, (2) THE BARRENS, (3) LITTLE MOUNTAIN, (4) MOULTON VALLEY, (5) INNER COASTAL PLAINS, AND (6) CUMBERLAND PLATEAU

Compiled from William D. Johnston, *Physical Divisions of Northern Alabama*, Geological Survey of Northern Alabama, Bulletin No. 38 (University of Alabama), 1930, p. 44; soil survey maps of Madison, Limestone, and Lauderdale Counties.

Local relief ranges from twenty to eighty feet, with slope gradients generally from zero to 8 percent. Scattered through the section are small sinks and slight depressions which give rise to local areas of poor drainage. Viewed from low elevations, such as the slopes of Little Mountain, the area presents an undulating to gently rolling surface. Such surface favors easy cultivation, whether by means of hand implements or machines.

The soils of the Red Lands are characterized by a light brown A horizon and a red or reddish B horizon. The A horizon has in many places been removed by erosion, thereby exposing the reddish B horizon. Hence the term "Red Lands." The surface soils are mellow and friable, are very easy to cultivate, and have the

physical properties which enable them to absorb and retain sufficient moisture for the growing of crops. They can be built up to a high state of productivity which is easily maintained by crop rotations, including the turning under of green manure crops and the addition of barnyard manure.⁶⁷

The pattern of land occupancy is characterized by the plantation. The huts of tenant farmers and sharecroppers, set in fields of cotton and corn, are a conspicuous part of the landscape. Interspersed through the area are forest-clad fields ranging in size from small wood lots to timbered areas of from fifty to sixty acres. Here and there exceptions to this general pattern may be found. Occasionally small fruit and vegetable farms are encountered. Then again, livestock and dairy farms may be seen, but both are conspicuous because of their rarity.

To the north and northwest of the Red Lands and extending into the state of Tennessee lies a section of slightly higher lands, in places quite rugged. It is the southern part of the Highland Rim of Tennessee. This area has been known for a long time as the Barrens. Light gray soils and a scrubby growth of timber were features which suggested to the early settlers land less productive than the Red Lands.

This section has wide variations in surface relief. The western part of Lauderdale County and the northwestern part of Colbert County are the most rugged. Narrow, winding ridges and pointed hills, with intervening V-shaped valleys, make up the topographic pattern. Slopes range from 15 to 40 percent.⁶⁸ The soil material is a mixture of rock fragments, sand, silt, and clay. These rugged areas are not a part of the arable land of the Region.

In the central and eastern part of Lauderdale County, in much of Limestone County, and in Madison County the topography of the section is much more subdued. In these localities the surface

⁶⁷ All soil surveys referred to in this section are published by the Bureau of Chemistry and Soils, United States Department of Agriculture (Washington: Government Printing Office). Reference to these surveys is made by title only. *Soil Survey of Lauderdale County, Alabama* (Series 1931, No. 26), pp. 10-11; "Soil Survey of Madison County, Alabama" (1911), pp. 813-18; "Soil Survey of Limestone County, Alabama" (1914), pp. 1135-40.

⁶⁸ United States Geological Survey, *Gravelly Springs Quadrangle, Alabama; Iuka Quadrangle, Mississippi*.

undulates gently. Much of this land has recently come under cultivation. The dominant soils of these topographically subdued areas belong to the Clarksville series. They are developed from the highly cherty material derived from the weathered limestones. "Because of the abundance of chert they have been well leached and have developed a profile with a gray or nearly white A horizon and a yellow B horizon, underlain by red clay with embedded chert."⁶⁹ These soils, therefore, are of low productivity in their natural state, but by the use of manures and the turning under of cover crops they can be brought into a very productive state. In places a hardpan layer, which occurs at a depth ranging from two to four feet beneath the surface, impedes the passage of soil moisture during times of drought.⁷⁰

Little Mountain lies south of and parallel to the Red Lands. It extends from east to west across Morgan, Lawrence, and Colbert Counties and ranges from eight to ten miles in width. It is a remnant of the Cumberland Plateau, gently rolling to almost flat on the upland areas, while the edges are extremely ragged and abrupt.⁷¹

The steep and stony plateau escarpments are not suitable for the production of agricultural raw materials, but the plateau flats have both a favorable topography and soil for such enterprise. The dominant soil is a light-gray or grayish-yellow silt loam, which grades at about twelve inches into a yellow friable clay loam. This soil, like the others of the Region, is lacking in organic matter and lime, but it responds very readily to fertilization and with the incorporation of green manures is built up to a rather high state of productiveness. The chief deficiency of the soil is its low water-holding capacity. The underlying sandstone is not retentive of moisture; hence crop yields are best during years of moderately heavy and well distributed rainfall.⁷²

⁶⁹ Marbut, *Atlas of American Agriculture: Part III, Soils of the United States*, p. 46.

⁷⁰ *Soil Survey of Lauderdale County, Alabama*, pp. 21-30; "Soil Survey of Limestone County, Alabama," pp. 818-22; "Soil Survey of Madison County, Alabama," pp. 1132-35.

⁷¹ Johnston, *Physical Divisions of Northern Alabama*, p. 44.

⁷² "Soil Survey of Lawrence County, Alabama" (1914), p. 1183; "Soil Survey of Morgan County, Alabama" (1918), p. 602.

Little Mountain was relatively inaccessible in times past, but with the completion of highways and the rise of highway transport it has undergone rapid agricultural development and is now intimately related to the economy of the lowlands both to the north and to the south.

South of Little Mountain lies the Moulton Valley. This valley is about fifty miles long from east to west and between three and ten miles wide. It is a rolling, open, limestone lowland, topographically favorable for agricultural production. The soils already described for the Red Lands predominate and most of them are under cultivation.⁷³ Scattered among the favorable soils are small patches of poorly drained silt loams, most extensively developed in the eastern end of the lowlands. These areas of poor drainage are often spoken of as "crawfish lands." Forests occupy most of these areas.⁷⁴

The Moulton Valley, with no longitudinal railroad, was quite isolated until recently. A splendid highway, running from Decatur through Moulton to Russellville and from there connecting with the tri-city center by U. S. Highway 43, has given this section close contact with the cities on the Tennessee River (Fig. 1). Agriculture has developed rapidly and the valley is now functioning as an integral part of the Region.

The southwest corner of Colbert County and the western portion of Franklin County form part of the Inner Coastal Plains area. This area is minutely dissected by very narrow, high, winding ridges and intervening V-shaped valleys. Local relief varies from 200 to 300 feet. The surface is covered with an undifferentiated soil material consisting of a mixture of rounded chert and quartz gravels and platy fragments of sandstone, among finer particles of clay, silt, and sand. The rough topography and excessive surface drainage, combined with the character of the soil material, preclude cultivation. Forestry and tree-crop agriculture are the two forms of suitable land utilization.⁷⁵

The Cumberland Plateau borders the Region on the east and

⁷³ "Soil Survey of Lawrence County, Alabama," pp. 1168-73; *Soil Survey of Franklin County, Alabama* (Series 1927, No. 30), p. 14.

⁷⁴ "Soil Survey of Morgan County, Alabama," p. 596.

⁷⁵ *Soil Survey of Franklin County, Alabama*, pp. 25-26.

south. Taken as a whole, it contributes little to the Region's agriculture. To the south the plateau is known locally as Sand Mountain. Some of the upland flats do have a surprising development of commercial agriculture. But these areas are oriented toward Birmingham, and any future increase in production will undoubtedly continue to find its outlet in that direction.

This survey of the soils and topography has shown that great differences exist within the Region for the production of agricultural raw materials. The limestone lowlands, the Red Lands and Moulton Valley, hold first place, acre for acre. But the upland flats of Little Mountain and the areas of subdued topography in the Barrens have proved to be remarkably productive under careful management. The somewhat droughty character of the soils of these latter two areas appears to be their weakest feature. The remaining areas are generally too stony and too rugged to be considered in a permanent program of agricultural raw-material production. The utility of these rough lands will be considered later.

One more statement remains to be made concerning the Region's soils as a whole. Though the soils are easily worked in many of the areas and are quickly responsive to improved methods of handling, they are generally deficient in plant nutrients and therefore require a periodic application of commercial fertilizer. In 1929 the Region spent on fertilizers an average of \$2.50 for every acre of land in crops.⁷⁶ A reduction in this cost will undoubtedly be effected in the immediate future. The progressive farmers of each community, the agricultural colleges, high schools, and farm magazines have for some time been pointing the way to cheaper soil maintenance. The Tennessee Valley Authority's educational work in soil management and the Soil Conservation Service have further stimulated interest in such a program. This program calls for the growing of legumes to supply the nitrogen requirements of the soil, to act as cover crops, and to furnish large quantities of organic matter. But the soils are especially deficient in phosphates. To supply that deficiency, the Region is very favorably situated. It has access to the south-central Tennessee phosphate deposits, where numerous plants

⁷⁶ *Fifteenth Census of the United States: 1930. Agriculture, II (Part 2), 1041-44.*

processing the rock are located. The phosphate rock reduction plant of the Tennessee Valley Authority at Muscle Shoals is, of course, in the Region's midst.

Industry's interest in agriculture.—The foregoing description of the Region's climate, topography, and soils gives emphasis to Somers's view that it is a "‘land of Goshen’ where every product of the soil may be grown and cultivated with rare success." But at present, even as in Somers's time,⁷⁷ commercial agriculture rests heavily on cotton. This important industrial raw material was being produced on 30.7 percent of the crop acreage in 1934 (Table 10). Cotton production, as measured by cotton ginnings during the period from 1926 to 1935 inclusive, has run from a high of 280,123 bales in 1931 to a low of 154,471 bales in 1935.⁷⁸

This supply of cotton is not an advantage of primary importance to the local cotton textile industry. The present-day specialization and fine adjustment of machinery require that a mill use a definite type of raw material. Cotton, therefore, must be brought in from other areas, often remote, for blending purposes. It was not possible to ascertain, for the Region as a whole, what proportion was thus brought in. One yarn mill, located to the immediate north of the Region but facing a raw material supply similar to the mills in the Region, annually secures from 1,200 to 1,500 bales from local planters, which is on an average 35 percent of its annual consumption. It is the practice of this particular concern to distribute to the planters, free of cost, a carload of cottonseed of special selection, which costs the mill \$2,000. Such seed assures more locally grown cotton of the desired staple length. This cotton the mill can purchase at a saving of 1¼ cents per pound over cotton brought in from the Memphis territory. If it is assumed that the mill purchases annually an average of 1,400 bales of local cotton, a saving, after deduction of seed costs, of \$6,650 is ef-

⁷⁷ Somers commented as follows on the Region's agricultural practices: "In the meantime its agriculture has reached only a rudimentary and transitional stage, of which cotton was the beginning and is still the end, with little garnishings of 'hog and hominy' as a collateral, but, so far, all too narrow basis of security." *The Southern States since the War*, p. 113.

⁷⁸ Letter from Frank M. Taylor, Associate Agricultural Statistician, United States Department of Agriculture, Bureau of Agricultural Economics, Montgomery, Sept. 14, 1937.

fectured. A second mill secured 60 percent of its cotton from local planters, at a saving of $\frac{1}{3}$ cent per pound. This plant, located in the tri-city center, has better access to the Memphis territory and this explains in part the much lower differential between the price of cotton from local planters and the price of cotton shipped in.

The significance of a local cotton supply, when viewed in the light of total manufacturing costs, cannot be stated quantitatively for any one mill. Two plant managers stated that it would be less than one percent. This agrees with findings of cotton costs that have been made over a much wider territory. Differences in raw-material costs have been computed for mills located on the Southern Piedmont and those of New England. "On a large part of its raw material the advantage of the industrial Southeast over New England runs from 0.6 per cent to 1.5 per cent of the cost of cotton at Fall River with the value of cotton assumed to be 20 cents a pound. The raw material cost in New England will hardly run more than 45 per cent of the total manufacturing cost of cloth so that the handicap to New England mills will amount to from 0.27 per cent to 0.67 per cent of total costs."⁷⁹

The question of a local cotton supply and the manufacturing advantages it brings must also be viewed in terms of the ultimate destination of the finished goods. Some of the mills find a market for their entire output in the South. For these mills a local or near-by source of raw material is a distinct minor advantage which equals the advantage of a near-by market. Other mills ship more than 75 percent of their output to the New England, New York, and Philadelphia areas, or to the Lake states. In the latter case freight charges on the finished goods must be reckoned with, and these finished goods fall in a higher rate class than the rough cotton bale. Such mills, therefore, have their lower raw material costs, due to a local cotton supply, offset by the higher marketing costs of the finished articles.

It has been shown that cotton is the only agricultural raw material of the Region entering industry directly and that it has been only one of several minor factors favoring the establishment and growth of the cotton textile industry. A local cotton supply does

⁷⁹ Grossman, *The Possibilities of Cotton Manufacturing in Texas*, pp. 18-20.

not appear to be important enough to have had any locational influence of real significance. The primary factors favoring the rise of a cotton textile industry in the Region will be dealt with at a later point. A by-product of the raw-cotton industry is cottonseed, and this has given rise to a cottonseed-oil industry, limited to the expression of the crude oil and the preparation of the pressed hulls. The volume of this industry is strictly determined by the local supply of cottonseed. An area with a radius of forty miles generally appears to be the largest territory from which the seed is assembled.

A forward view of the rôle of agriculture in supplying raw materials to industry must first of all allow for the agricultural diversity that is possible in the Region. Vegetables and truck crops of all kinds are successfully grown. Apples, plums, grapes, dewberries, blackberries, raspberries, and strawberries are all grown and thrive. Most of the legumes do well. Small grain can be grown with satisfactory results, and corn is widely produced as a staple throughout the Region.⁸⁰

An areally compact case study of agricultural diversity is presented in Figure 5. This farm, located on the Red Lands eleven miles east of Sheffield, has nothing unique in the way of physical site. Its 380 acres of soils and its topography could be duplicated many times over in various parts of the lowland sections. Yet none of the distinguishing marks of the typical plantation are observable in the utilization of the farm.⁸¹ There is no monotonous repetition of cotton and corn. Over 90 acres of pasturage suggest one important activity of the farm, namely dairying. The needs of sixty head of cattle also explain the large acreage in forage crops and corn. Much of the corn is used for ensilage. Small grains occupy 12 percent of the crop land, whereas cotton has been relegated to a position of secondary importance

⁸⁰ The various soil surveys to which reference has been made at earlier points, all emphasize the great diversity of products that can be grown successfully.

⁸¹ Mr. C. Streit, the owner, acquired the farm in 1913. It was run down to a point where it would produce no more than a few bales of cotton. From that stage he developed the farm into an intensive producing unit by improving it from year to year, as capital became available from the sale of farm produce. His attitude toward land is significant: "Land must be treated like a dairy cow; it must be protected and fed if it is to produce."

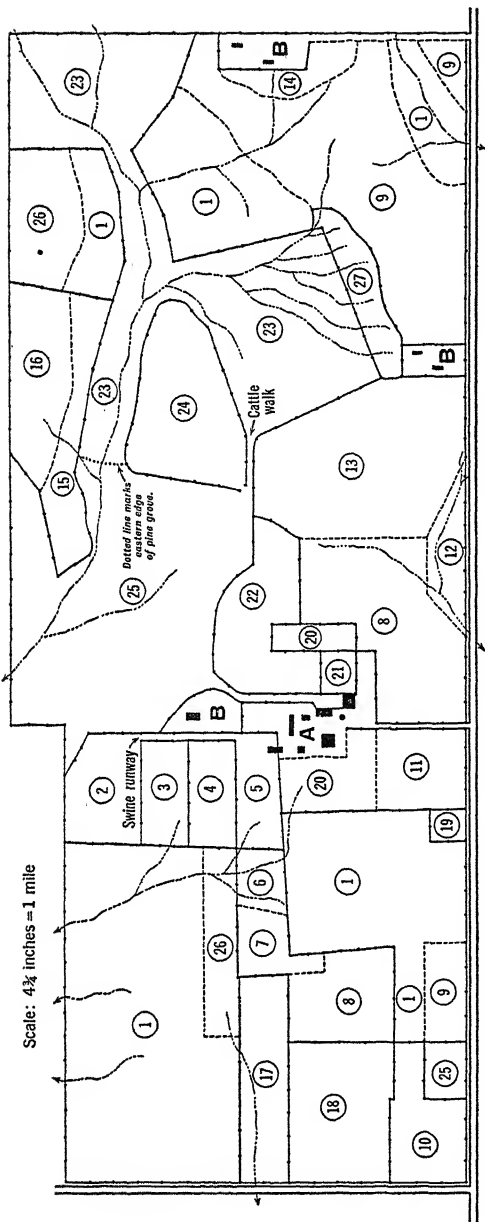


FIGURE 5

FIELD PLAN INDICATING, IN PART, THE DIVERSIFIED LAND USE OF MR. C. STREIT'S FARM, JUNE, 1935

(1) corn; (2) peas, (3) lespedeza and peas, (4) rye and lespedeza, (5) peanuts; (6) corn and cowpeas; (7) sugar beets; (8) oats and lespedeza; (9) cotton; (10) moonpeas; (11) wheat and lespedeza; (12) wild grass for hay; (13) sweet corn; (14) peanuts; (15) sweet potatoes; (16) white potatoes, double crop; (17) sorghum; (18) soybeans; (19) fruit and nut orchard; (20) mixed-fruit orchards; (21) dewberries; (22) mixed vegetables; (23) pastures; (24) pasture sown to rye and lespedeza; (25) pine grove and pasture; (26) idle land, white potatoes as fall crop; (27) eroded slope being reclaimed; (A) Mr. Streit's farmstead; (B) helpers' places. Compiled from author's field map of June, 1935.

TABLE 10
A COMPARISON OF CROP-LAND UTILIZATION *

| CROPS | STREIT'S FARM, 1935, PERCENTAGE OF TOTAL | REGION, 1934, PERCENTAGE OF TOTAL |
|---------------------------------------|--|---|
| Corn | 32.7 | 41.5 * |
| All hays and sorghums for forage..... | 12.7 | 14.4 |
| Small grain | 12.1 | 0.9 |
| Cotton | 11.9 | 30.7 |
| White potatoes | 7.9 | 0.5 |
| Beans and peas | 6.7 | 4.6 |
| Soybeans | 4.2 | 4.1 |
| Vegetables harvested for sale | 3.6 | 0.2 |
| Fruit orchards and vineyards | 3.2 | 0.8 |
| Peanuts | 2.5 | 3.0 |
| Sweet potatoes | 2.4 | 0.5 |

* Sources: Percentages for Streit's farm were calculated from planimetric measurements of fields as plotted on the original map. Percentages for the Region were calculated from the *United States Census of Agriculture: 1935*, Vol. I, Alabama, Table III; Vol. II, Alabama, Table VI.

(Table 10). For swine, four pastures are reserved. These are planted in such order that forage is available for the herd from early spring until late autumn. Fruits and vegetables hold a conspicuous place in the program of land utilization. The annual sale of dewberries, blackberries, strawberries, grapes, white potatoes, sweet potatoes, and tomatoes is a significant source of income. Soybeans and peanuts are regularly included in the program of crop rotation, with the former occupying 4.1 percent of the cropped acreage in 1935. None of the produce of the farm undergoes processing, with the possible exception of swine, which are shipped to small packing plants. The dairy herd produces milk, which is sold over milk routes in Sheffield. In 1935 much of the dewberry, strawberry, potato, and tomato crops was sold to the commissary at Wheeler Dam.

The dairy herd and others like it, however, could be producing milk for milk condenseries. The Borden Southern Corporation, the Pet Milk Company, and Swift and Company have plants immediately to the north of the Region, throughout a section of

south-central Tennessee. These plants give an outlet to dairy production above local needs. They have aided the program of agricultural diversification and have given added enterprise to the small cities in which they are located. Similar development could take place in the Region. The suitability of the Region to produce fruits and vegetables could give rise to a small canning industry. It has none at present.

The Region's land can also be made to produce more of the food needed by the Region's industrial population. In connection with such production, the problem of food preservation and storage comes to the fore. In the past, methods of preservation have been confined to home canning and to simple storage in cellars. Surprisingly little of the locally produced food, however, has been carried over into the winter season in either manner. No quantitative data can be cited, but information secured through interviews suggests that food canning is seldom attempted.

It appears that the quick freezing of food may be a major factor in the solution of the problem of food preservation in the Region. The process of quick freezing is making astounding progress. The possibilities it offers, therefore, cannot be visualized, even for the limited period of one decade. More and more types of fruits, vegetables, and meats are being successfully preserved in this manner. The quick-freezing units and storage facilities are being made more flexible. Small units operate as efficiently as large units.⁸²

The Region affords a number of advantages for this method of food preservation. It can produce a diversity of products which fits this industry well. It has cheap and abundant power. Guidance in the establishment of the industry can be given by the Tennessee Valley Authority. Lastly, freezing of local food for local consumption can eliminate costly transport in refrigerated railway cars and trucks. Quick freezing is a method of food preservation that holds promise for the Region.

A more abundant, year-round, fresh food supply will be one factor contributing toward the abolishment of the industrial worker's inadequate and poorly balanced diet, which was cited by

⁸² Mundee and Porcher, *Quick-Frozen Foods*, pp. 1-8.

a factory superintendent of one of the Region's important plants as the chief cause lowering the worker's vitality and efficiency.⁸³ As the home space in the Region continues to decentralize, more and more of the industrial workers may engage in food production as a part-time activity, and can use the new methods of food preservation to their own immediate advantage. This decentralization of the worker's home space and its relation to living conditions will be examined more fully at a later point.

THE FOREST RESOURCES

The Region's forest resources have played an important rôle in its industrial history. Since early times and, in particular, since the period of industrial promotions, they have contributed the raw material for a variety of forest-product industries.⁸⁴ For several decades, however, the importance of the industry has been waning. It is clear that this decline is due to the exhaustion of the Region's high-grade timber. Before any significant revival in this industry can take place, the forests of the Region must be brought to a stage of increased productiveness. Such increased productiveness cannot be secured on short order. The immediate outlook for the forest-product industries, therefore, is one of continued curtailed operation.

The rise and decline of the forest-product industries.—Originally the Region was cloaked in a continuous forest. A magnificent stand of hardwoods predominated in the northern part of the Region. Conifers prevailed in the western and southern part. During the pioneer stage of human occupance, portions of this forest were cleared away to make room for cotton. Some wood was used in the manufacture of vehicles, tools, farm implements, and in the construction of houses, but the timber thus consumed was no drain on the Region. As land became exhausted it was allowed to revert to timber. Under the trying conditions following the Civil War, much cleared land had to be abandoned and

⁸³ This statement concerning the poorly balanced diet was not an expression of opinion. The concern in question has a company doctor, and data on employee illnesses are quite complete.

⁸⁴ The term "forest-product industry" includes both lumber mills and non-lumber woodworking industries.

this was also returned to forest. These areas of second-growth timber and the extensive remaining tracts of original forest supplied the raw material to the lumber industry, as it began to advance through the Region during the decade from 1880 to 1890. A lumber-trade directory of 1890 lists twenty-one mills for the Region, most of which were active in cutting and finishing a variety of hardwoods, especially poplar, oak, ash, tupelo gum, and walnut.⁸⁵

The decade 1880-90 also witnessed the establishment of large non-lumber woodworking industries. The year-to-year expansion of the industry cannot be traced, because data are lacking. Data are available for the year 1912, a year in which the forest-product industry was probably near the peak of its production. During that year there were in the Region twenty manufacturers of wood products, many of whom operated large establishments with a diversified output. They manufactured vehicle dimension stock, sporting goods, shuttles, spools, bobbins, sash, doors, blinds, finishing wood, furniture, pump logs, columns, boxes and crates, handles, and cooperage stock.⁸⁶ No list of lumber mills for 1912 is available; hence the exact extent of the forest-product industry cannot be stated.

But in the Region, as in other exploited forested areas of the United States at that time, the forest-product industry was dependent on unreplaced supplies of raw materials. In accessible areas the fine stands of mature timber vanished rapidly, and,

⁸⁵ A news item from Decatur, Alabama, dated March 31, 1890, suggests that the lumber industry was well under way at that time. The commentator wrote as follows:

"The past year has been one of unusual prosperity with our lumbermen. The building boom kept right along, creating a demand for lumber and building materials, and our mills were kept crowded with orders.

"The United States Rolling Stock Works will begin soon on 1,000 fruit and coal cars. The works are turning out about 16 cars a day and would increase the number to 20, if they could get timber in fast enough.

"Arantz Bros., who recently sold 300,000 feet of quartered oak to a New York firm, have contracted with the same firm to furnish 1,000,000 feet of poplar, 500,000 feet of oak and 250,000 feet of ash and gum, and the firm is given the option of trebling the order if they can get the stuff out. Arantz Bros. started their mill here in 1881." "Directory of Lumber Mills in Alabama," *The Northwestern Lumberman*, XXXV (April 5, 1890), 17, 19.

⁸⁶ Harris and Maxwell, "The Wood-Using Industries of Alabama," *Lumber Trade Journal*, LXI (May 1, 1912), 19-30.

with the development of roads and the logging truck, areas hitherto beyond the reach of profitable exploitation were tapped. Cutting in excess of the rate of reproduction appears to have continued into the present period. The resulting gradual decline in available timber has compelled a shrinkage of the forest-product industries.

This shrinkage, as far as it pertains to the lumber industry, can be best stated in the words of one of its representatives, who witnessed the changes during recent decades. He points out:

As to your question concerning the lumber industry in northern Alabama, it has very decidedly been on a decline for the past 25 years due to depletion of the timber supply. In our immediate locality there are no large mills and practically no small mills cutting strictly hardwood lumber. The pine which the mills now operating are cutting is principally second growth timber which springs up very rapidly. What timber we use and buy usually comes from small wood lots and scattering trees. There are left in the county [Limestone] a few large trees of good quality in both poplar and oak, our two principal hardwoods.⁸⁷

Limestone County has experienced a more severe decline than certain other parts of the Region. It has much good land for agriculture and the aim in many instances has been to clear the land for crop use. But individuals in other parts of the Region, who were familiar with the forest-product industry, testified that a notable decline had occurred.

The present forest-product industry and forest resources.—The present position of the forest-product industries can be stated with considerable exactness. There were 243 lumber mills in the Region in 1938. Shifts during the years 1936 and 1937 consisted in the abandonment or moving out of 12 and the opening of 6 new mills. All of the mills fall within the smallest class, namely the 1-19 M group on the basis of ten hours of operation. These mills are not classified as to the type of timber they cut. Table 11 shows that the largest number of mills are located in the southwestern part of the Region, the area of shortleaf and loblolly pine. This suggests that the cutting of pine is at present of much greater importance than the cutting of hardwood timber.

⁸⁷ Comment of the owner and operator of a lumber company.

TABLE 11

LUMBER MILLS IN THE REGION BY COUNTY, 1938
1-19 M, 10-HOUR DAILY CAPACITY *

| COUNTY | NUMBER OF MILLS |
|------------------|-----------------|
| Colbert | 41 |
| Franklin | 53 |
| Lauderdale | 36 |
| Lawrence | 26 |
| Limestone | 21 |
| Madison | 29 |
| Morgan | 37 |
| <hr/> | |
| Total | 243 |

* Source: United States Department of Agriculture, Forest Service, Southern Forest Experiment Station, "Forest Industrial Plants in Alabama, 1936-1938 Listing."

The large number of mills is not an index to the amount of lumber cut annually. Many of the mills cut no more than a few thousand board feet per annum, and this cut is often for local use. Others operate for a few weeks in a season. Only a few cut continuously and accumulate large inventories. The yards of such mills sometimes serve as concentration points for pine lumber cut by mills in outlying areas. Here it is seasoned, surfaced, and stored.⁸⁸

The present non-lumber woodworking industry consists of four cooperage-stock plants, two veneer mills, two dimension-stock plants, one handle factory, and one wood-extract plant. To this list there may be appropriately added one factory manufacturing wagons and producing its own wagon-dimension stock. Most of these mills are small and employ from ten to twenty workers. The largest non-lumber woodworking plant of the Region, on the basis of timber consumed and workers employed, is a box and basket factory. The wood for this plant, such as tupelo gum, formerly came to a large extent from the flood plains of the Tennessee River. But in 1935 these stands of timber were being cut and destroyed in the process of clearing the areas of what is now

⁸⁸ United States Department of Agriculture, Forest Service, Southern Forest Experiment Station, *Sawmills in the Lower South*, pp. 1-4.

stocked, and a great many of the stands are less than half stocked. To increase the amount and value of the forest, fire protection and intelligent handling of the timber stands, both large and small, are needed. Such a program would include a considerable amount of forest planting, in order to restock thin natural stands. Because of the long growing season and the abundant supply of moisture, proper handling of the forest would result in a rapid increment in the timber supply.⁹²

From the foregoing summary of the Region's timber resources it is clear that forest-product industries, turning out standardized commodities in volume to be assembled elsewhere, must continue to operate on a curtailed basis. Small industries of the Region, in which wood is one of several important raw materials, however, appear to be assured of an ample supply. The Florence Wagon Company buys all its wood locally, chiefly oak and hickory. Farmers and small country mills bring in the wood, which has to be purchased several years in advance of use to assure proper curing. The company has never experienced difficulty in getting all the wood needed. It was the opinion of the president of this company that the wood needs of his firm could be met indefinitely from local sources, even at capacity production. Sufficient timber resources are also available for industries making wood products of individuality and character. Such craft industry does not now prevail. This industry first of all requires artisans, who are steeped in the tradition of wood carving. The lack of such an artisan class precludes the establishment of this craft industry at present.

The Region's forest resources in relation to a pulp-and-paper industry.—There remains to be considered the Region's forest as a source of raw material for the pulp-and-paper industry. The recently accelerated expansion of that industry in the South makes pertinent an examination of this problem.

The chief reason for the expansion of the industry in the South is the availability of pulp wood, its present comparatively low cost, and the prospects for its continued growth at reasonable costs and within relatively short time-periods. Suitable lands from the

⁹² Letter from I. F. Eldridge.

standpoint of pulp-wood supply and production are available over immense stretches. The distribution of the industry within the South, therefore, is determined by factors other than pulp-wood supply.

A study of the distribution of the industry in the Deep South as a whole will aid in showing to what extent the Region favors such an industry. There are in the eight states of the Deep South twenty-six pulp or pulp-and-paper mills, fourteen of which have been built since the beginning of 1930. The availability of deep-water harbors appears to have been the most important factor determining the distribution of these mills. Seven of the twenty-six mills occupy deep-water harbor positions on the Atlantic, and eight hold such an advantage on the Gulf.⁹³ The number of deep-water harbors along the Atlantic and Gulf Coasts is comparatively limited. The first company, therefore, to occupy a location on one of these and to block up tributary pulp-wood lands has an outstanding advantage. The rapidity with which mills have occupied the suitable seaboard positions since 1930 may be attributed to competition for such sites.⁹⁴

A second locating factor is a low-cost fuel supply. This factor assumes especial importance because the bulk of the plants in the Deep South are chemical pulp-and-paper mills. Twenty of the twenty-six mills use the sulphate process.⁹⁵ The mills which depend on chemical processes have a close balance between power and steam requirements.⁹⁶ Under such circumstances it is obviously most economical to generate steam at high pressure for power purposes and to use the exhaust steam in the digesters for cooking. Hydroelectric power at low rates is of no advantage, since steam is an essential in the process and balances the need for power. For the generation of steam, a low-cost fuel is an important favorable factor. The immense natural-gas fields of

⁹³ United States Department of Agriculture, Forest Service, Southern Forest Experiment Station, "Wood-Pulp Mills in Eight States of the Deep South."

⁹⁴ "Expansion in the South," *Monthly Review of the American Paper and Pulp Association*, IV (March, April, May, 1937), 2.

⁹⁵ United States Department of Agriculture, Forest Service, Southern Forest Experiment Station, "Wood-Pulp Mills in Eight States of the Deep South."

⁹⁶ Stephenson, "Pine, Pulp, and Paper for Posterity," *Pulp and Paper Magazine of Canada*, XXXVIII (Dec., 1937), 875.

northern Louisiana constitute such a source, in an area of satisfactory pulp wood. Around the gas fields are clustered eight of the twenty-six wood-pulp mills in the Deep South.

An adequate labor supply for pulp-wood cutting and assemblage and for millwork is available everywhere throughout the Deep South. This factor, therefore, is of no significance in the internal distribution of the industry.

An examination of the Region from the standpoint of the factors outlined for the Deep South as a whole shows that the Region has neither a cheap fuel supply nor access to a deep-water harbor. But the lack of these important locating factors is offset by a number of advantages.

The Region's forested area is approximately 1,100,000 acres. It was stressed at an earlier point that 50 percent of this forested area is occupied by stands of less than saw-log size. Such forests, although too immature for lumber, are satisfactory for the manufacture of wood pulp. A productive forest, sufficiently large to grow the pulp wood required for a mill of 200 tons' daily capacity, necessitates an area of about 150,000 acres of pine timber, with a potential growth of one cord per acre per year.⁹⁷ The Region has more than 150,000 acres of pine timber in its western part alone. The pine areas of the northeastern part of the state of Mississippi may be regarded as tributary to this Region, and these areas could add greatly to the supply. The hardwoods also constitute a suitable raw material, and from them certain quantities of pulp wood could be drawn. Pulp wood could also be obtained from those forested areas managed primarily to yield high-quality saw timber. In a sustained-yield program of forestry management, thinnings must periodically take place to assure proper growth of the trees which ultimately are to supply saw timber. These thinnings can be converted into pulp. Of the saw timber itself, a considerable portion of the upper part of the tree is either too small or too knotty for the better grades of lumber, and these "tops" can also be added to the pulp-wood supply.⁹⁸ Efficient use of the

⁹⁷ Wackerman, "Rival Industries Require Southern Pine," *Pulp and Paper Magazine of Canada*, XXXVIII (Dec., 1937), 888.

⁹⁸ *Ibid.*, pp. 887-89.

Region's forest would therefore be promoted by a pulp-and-paper industry.

But the Region's wooded areas are scattered and many are of rough topography, thereby increasing the cost of assembling the pulp wood at a central location. Rough lands with mixed stands of hardwood and pine, however, are used successfully by a number of pulp-and-paper mills located in the South. The large pulp-and-paper mill of the Champion Paper and Fibre Company at Canton, North Carolina, is, for instance, dependent on such a source of supply. The Region, therefore, cannot be ruled out on the basis of an inadequate and unsatisfactory pulp-wood supply. But the smoother coastal lands of the Deep South, with long-leaf and slash pine in more continuous stands of timber, afford some advantages in the cutting and assemblage of pulp wood which are not possessed by the Region.

The Region obviously has no direct access to a deep-water harbor, but as a partial substitute it can soon utilize the improved navigation facilities of the Tennessee River. A pulp-and-paper plant could be adequately served by a large common carrier or by an industrial carrier.⁹⁹

The Region has no access to cheap fuel. It appears that a chemical pulp-and-paper mill would find this to be the Region's most serious deficiency. But if the mill should employ a combination chemical-and-ground process, or make entirely ground wood for paper, the power load in relation to the steam requirements for heating and cooking would rise enormously. In that event the low industrial power rates of the Tennessee Valley Authority would constitute a favorable factor. The mill, located near Wilson Dam, could purchase power from the switchboard of the Wilson Dam power station.

The pulp-and-paper industry requires great quantities of water. For that purpose the Region's surface waters could be utilized. In the natural state these waters have deficiencies, but the quality of Tennessee River water is such that modern methods of purification can bring the water to the desired purity at low cost.¹⁰⁰

⁹⁹ See analysis of inland waterway facilities, Chapter V.

¹⁰⁰ Behrmann, "Water Purification to Meet Paper Mill Requirements," *Paper Trade Journal* (Feb. 25, 1937), pp. 142-45.

In the recent rapid expansion of the pulp-and-paper industry in the Deep South, the choice sites were at deep-water harbors, although cheap fuel in the form of oil and natural gas also exerted an influence on location. In the next wave of expansion, there undoubtedly will be a keen search for suitable sites in the interior. In that event the Region appears to be in line for consideration as a locus for a pulp-and-paper plant of moderate capacity.

Chapter V

MARKETS AND INDUSTRIAL SITES



THE REGION is not in a favored competitive location when viewed from the standpoint of markets. There are no large concentrated centers of consumption within and adjacent to it. The manufacturers of the Region must seek an outlet for their wares in a scattered south-wide market or in centers of consumption which lie at considerable distances. The Region's large industries, therefore, must be of a type which manufacture products that lend themselves well to shipment over long distances. Distant and scattered markets put a premium on efficient transport. The Region has access to railway, highway, and inland-waterway transportation facilities. These facilities are more than adequate for present traffic and they enable the Region to reach all the nation's marketing areas and export ports by way of near-by traffic junctions. But adequate transportation facilities can compensate only in part for an out-of-the-way location. In considering the delivered-to-customer cost of manufactured commodities, comparatively high shipping costs, therefore, will have to be reckoned with, and the time required for such goods to reach markets will be comparatively longer.

Markets.—The Fifteenth Census of the United States credits the Region with a population of 270,732. This population is nowhere notably concentrated. Centers of population, ranging from villages of 100 and more to small cities with 2,500 to 15,500 inhabitants, are set in agricultural communities with densities of rural population ranging, on a county basis, from 24 to 50 per

square mile.¹ This population pattern extends into the areas which bound the Region to the north and the west. To the immediate east and south of the Region, the urban centers are more scattered and are limited to village size. The Region and contiguous areas, therefore, present a thin and scattered market, when viewed from the standpoint of their population pattern. This thin and scattered market also has a low per-capita buying power. An estimate of this buying power credits the Region's counties with average buying power indices ranging from a low of 20 to a high of 57, with the United States as the base, 100.² The nearest marketing centers of moderate population size are such cities as Nashville to the north and Birmingham to the south, Chattanooga to the east, and Memphis to the west. But these are significant centers of industry and trade in their own right and command large tributary trading areas which press in upon the Region from all sides.

It is clear, therefore, that the Region's industries which depend on markets within near-by areas cannot be more than small establishments. Such are the brick and tile works, the asphalt-rock plants, and the pottery factory. All market the bulk of their output within adjacent areas. The occasional shipments to distant points may be distress sales. The pottery³ has sent its wares to points as far away as 250 miles, while the brick and tile works

¹ Calculated from the *Fifteenth Census of the United States: 1930*. Population, Vol. III.

² These indices are based on the relationship between the percentage of national buying power and of population by county. The percentage of national buying power is a weighted composite percentage for each county based upon (1) estimates of current income and retail sales for 1936, and (2) 1936 actual sales of new passenger cars. "Survey of Buying Power," *Sales Management*, XL (April 10, 1937), 673-82, 754-55.

In his illuminating map, which presents an estimate of "planes of living" on a county basis for the whole nation, Carter Goodrich shows that two counties of the Region ranged below 15 percent and five counties ranged between 15 percent and 40 percent with the United States as the base, 100. The plane-of-living map is based on per-capita income-tax returns (1928), residence telephones (Jan. 1, 1930), and radios (1930), each as a percentage of its national average. This map suggests comparatively low per-capita purchasing power for the Region during the late 1920's. Goodrich *et al.*, *Migration and Economic Opportunity*, Plate I and pp. 17-20.

³ The pottery turns out coarse earthenware. Fine pottery, made at any location, of course has the whole world as a market.

have marketed drain tile as far away as Florida and along the Gulf Coast.

A second group of factories markets most of its output in territory south of the Ohio River and east of the southern Rocky Mountains. The wagon factory and the stove plants find outlets in this large area, though the latter sell hollowware in a nationwide market, through retail mail-order firms. The inner-tube factory and the box and basket factory also belong in this group, though both reach beyond the south-wide market from time to time. The box and basket factory markets primarily along the eastern seaboard, while the inner-tube plant has had special sales arrangements for part of its output through Akron, Ohio.

The third group, which is the largest in number of plants, sends its output to special destinations for further processing or for use in other industries. Most of the plants of this group employ from 100 to 500 workers and therefore represent the Region's middle-sized industries, as measured by number of workers. In this group are included the silk hosiery mills, which send their unfinished hose to Michigan and New York State; the cottonseed-oil plants, which deliver the crude oil to refineries at Memphis and Atlanta; the tire-cord mill, which ships much of the tire cord to tire factories at Gadsden, Alabama, and Akron, Ohio; the wood-extract plant, which delivers its tannin to plants at Louisville and Nashville; a cotton mill manufacturing narrow sheeting, which is sent to cloth-bag manufacturers located in Boston, New York, Chicago, and Kansas City, Missouri; an elastic-braid factory, which delivers its entire output in New York City; and cotton yarn mills, which not only sell yarn locally but also in markets from Philadelphia to Boston and in Cleveland and Chicago.

A fourth group of factories markets its wares directly on a national and even international scale. The largest cotton mills of Huntsville, which are the largest plants in the Region in number of workers, undoubtedly belong in this class. No field data are available concerning these plants. Some of these mills have been important exporters to Canton, China, and other far eastern points.⁴ A middle-sized company, manufacturing ornamental lamp

⁴ Chapman, "Huntsville Life in the Gay Nineties," *Huntsville Times*, July 1, 1934.

posts and ornamental iron, markets in urban centers from coast to coast. California, as an area of rapid city growth, was an important outlet during the 1920's. A firm manufacturing suit materials for various professional uniforms sells on a national basis. The knit-wear factories market through retail chain stores and retail mail-order houses and send their goods into a nation-wide market.⁵

The foregoing brief survey of the Region's marketing territory emphasizes the fact that some of it is scattered and much of it is remote. Such a situation calls for adequate means of transportation to distant points. In the remaining paragraphs of this section these transportation facilities will be analyzed primarily from the viewpoint of the Region's marketing problem, though occasional observations will also be made regarding their function in the assemblage of raw materials and the provision of general goods from other areas.

Railroad facilities.—Railroad service into and out of the Region is provided by three railroad systems, with direct lines touching one or more of the cities in the area. These roads, the Louisville and Nashville, the Southern, and the Nashville, Chattanooga and Saint Louis, are rated among the first-class roads of the South (Fig. 6). Over their lines and connections all parts of the nation may be reached.

The Louisville and Nashville main line from New Orleans to Cincinnati passes through the Region, via Decatur and Athens. In addition, a branch line from Columbia, Tennessee, reaches the tri-city center. By way of Evansville and Cincinnati fast through-freight service is maintained to Chicago and the Northwest. A secondary line to Saint Louis opens the Middle West. All points in the Northeast are served via connections at Cincinnati. Southward the line places the Region in contact with Birmingham and Mobile, en route to New Orleans, and Pensacola is reached by a branch line. Connections with the Atlantic Coast Line at Montgomery open the whole southeastern coastal area to direct shipments from Decatur. Second-morning delivery is accorded to New

⁵ This description of the Region's marketing area is based entirely on field data, unless otherwise indicated, and applies for the summer months of 1935.

Orleans on less-than-carload freight originating at Decatur and Athens up to closing time at the local freight houses. Likewise L.C.L. freight received at these points prior to closing time is forwarded directly to Chicago and delivered on the second morning. Hence it can be said that excellent service is available over this route both north and south.⁶

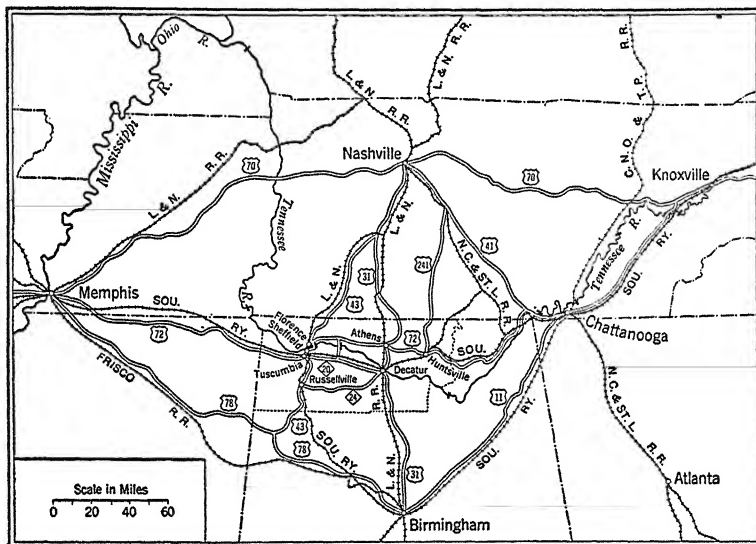


FIGURE 6

THE REGION IS BOUNDED BY THE COMMERCIAL PERIPHERIES OF NASHVILLE, BIRMINGHAM, CHATTANOOGA, AND MEMPHIS. Compiled from map, Tennessee Valley Authority, *Tennessee Valley Region* (Knoxville, 1936).

All the Region's important centers of industry are served by the Southern Railway system over a secondary main line which extends from Memphis to Chattanooga. At Chattanooga contact is made with the line which gives access to the North and Northeast by way of Cincinnati. An additional outlet to the Northeast is via the Southern and the Norfolk and Western through the Bristol and Hagerstown gateways. Southward via Chattanooga

⁶ Schedules furnished by the General Eastern Freight Agent, Louisville and Nashville Railroad, June, 1938.

the Region can reach Birmingham and New Orleans by the main line, with secondary lines directly to Atlanta and Jacksonville. The tri-city center also has direct service southward over a branch line to Birmingham. The Southern line, extending westward from the Region to Memphis, makes connections at Corinth, Mississippi, with the lines of the Mobile and Ohio and the Illinois Central, serving territories to the north and south. Via Memphis all parts of the West are readily reached. Fourth-morning delivery is regularly provided at Philadelphia and at Chicago on L.C.L. freight moving from the Region, while carload schedules to these destinations are uniformly faster than L.C.L. by one day or more. L.C.L. freight received at the tri-city center prior to closing time is delivered at New Orleans on the third morning.⁷

From Huntsville a branch of the Nashville, Chattanooga and Saint Louis Railway reaches the main line at Decherd, Tennessee. The main line, extending from Chattanooga to Nashville, comprises part of a through route from Florida to Chicago and is operated in conjunction with the Atlantic Coast Line and the Louisville and Nashville. From Huntsville this line accords third-morning delivery to Chicago, the freight being transferred into a through-package car at Nashville.

The foregoing survey suggests that the Region has railway connections as good as those available at most southern points. The facilities are certainly adequate not only for present traffic but also for any manufacturing development likely to come in the near future. But the true position of the Region in the transport pattern becomes apparent only when the service available at larger centers near-by is brought into the picture. With the exception of the Louisville and Nashville main line, the railroads have dodged the Region in constructing their principal arteries. Traffic originating on the Region's secondary main lines and on branch lines is therefore subject to significant delays at junction points. For instance, L.C.L. freight moving from the tri-city center and from Huntsville to New Orleans loses a day as compared with freight from Decatur, and L.C.L. freight moving from

⁷ Schedules furnished by the New England Freight Agent, Southern Railway, June, 1938.

all the cities of the Region to Philadelphia loses a full day at Chattanooga. Daily freight schedules are also less frequent. From Memphis, Nashville, Chattanooga, and Birmingham three or more daily freight schedules are available, but with the exception of Decatur and Athens only one schedule is available in any direction from the cities of the Region.⁸ Hence, while adequate facilities are available for more traffic than is handled at present, service is neither so fast nor so frequent as that accorded larger centers more favorably located with respect to the rail net. This area is, indeed, off the main routes and since little traffic originates in the Region it fares poorly in the provision of through-package cars. Freight must usually be transferred at least once before reaching its destination. This transfer is commonly accomplished at Nashville, Chattanooga, Birmingham, or Memphis, depending on the direction of movement.

The Region uses railway express service on such items as silk hosiery and knitted wear, which require speed in transit. For express service Decatur is again favored, since trains carrying express operate through to Chicago in as little as fifteen hours on daily schedules.⁹ Similarly fast schedules to New Orleans, and connections at Cincinnati with lines for the eastern seaboard assure excellent service in every direction. The other centers in the area, however, must depend upon the two daily east and west schedules of the Southern Railway and their connections.¹⁰

The Region's position in the rate structure of the South presents another modification of the picture. Since the Southern Basing Point System has broken down, rates are almost universally based on distance.¹¹ Thus, as may be expected, rates to eastern centers are lower from Chattanooga than from the cities of the Region and grow progressively higher from points farther west. Huntsville and Decatur have an advantage over Birmingham, while the tri-city center is at a slight disadvantage. To

⁸ New England Freight Agent, Southern Railway, General Eastern Freight Agent, Louisville and Nashville Railroad; Illinois Central System, *Time Table No. 75*, pp. 29-30.

⁹ Louisville and Nashville Railroad, *Time Tables* (April 18, 1938), p. 6.

¹⁰ Southern Railway, *Time Tables of Passenger Trains* (May, 1938).

¹¹ Locklin, *Economies of Transportation*, p. 188.

destinations north and northwest, as to Cleveland and Chicago, Nashville enjoys a slight advantage, while Chattanooga and Birmingham generally take somewhat higher rates than cities of the Region. There are exceptions in the rates on certain commodities, but this relationship holds in general. It must be realized, however, that these differences in rates are only matters of a few cents per hundred pounds (Table 12). The discriminations formerly favoring Memphis and Nashville have been largely done away with.

Highway facilities.—The highway routes into and out of the Region exhibit a pattern which parallels closely the rail net. The most important route is the north-south highway, U. S. 31, from Nashville to Birmingham, which passes through the Region via Decatur and Athens. From Nashville it makes easy connections with all points north of the Ohio River by way of Paducah, Evansville, Louisville, and Cincinnati. Grades are easy, though the roadbed between Nashville and Ohio River points is narrow and extremely winding in some stretches. Southward, via Birmingham, this road gives direct access to Jacksonville, Pensacola, Mobile, New Orleans, and points on the Gulf west of the Mississippi River. Over this route, immediately south of the Region and as far as the northern edge of the Black Belt of Alabama, stretches of heavy grade and winding road are encountered.

Highway U. S. 72, in conjunction with Alabama State Highway 20, affords an east-west route from Chattanooga to Memphis which touches all the important centers of industry in the Region. To the immediate west of the Region, at Corinth, Mississippi, this route connects with U. S. 45, which opens areas to the north and northwest by way of Cairo and Saint Louis and leads south into the northern part of the state of Mississippi. Through Memphis the trans-Mississippi areas are easily accessible. The route to Memphis passes over a comparatively smooth terrain and has a satisfactory roadbed, which is undergoing further rapid improvement. Eastward, via Chattanooga, direct contact is made with the important highways of the Great Valley and the numerous connections which those roads afford. Between the Region and Chattanooga winding road and difficult grades are encoun-

TABLE 12

COMPARATIVE FREIGHT RATES BY RAIL AND HIGHWAY FROM CENTERS
IN THE REGION AND FROM ADJACENT TRAFFIC JUNCTIONS
TO SEVERAL LARGE CITIES *

IN CENTS PER HUNDRED POUNDS †

| FROM: | TO: | BARREL STAVES | | | COTTON SHEETS | | COTTONSEED OIL | | |
|-------------|--------------|---------------|-----|-------------------|---------------|---------------------|----------------|-----|-------------------|
| | | Rail CL ‡ | LCL | Highway Volume | Rail Any | Highway Quantity | Rail CL | LCL | Highway Volume |
| Decatur | Chicago | 38 | 72 | 71 | 89 | 125 | 44 | 98 | 62 |
| Huntsville | | 40 | 73 | 73 | 91 | 128 | 45 | 101 | 64 |
| Sheffield | | 37 | 70 | 71 | 106 | 124 | 43 | 98 | 62 |
| Chattanooga | | 37 | 74 | 75 | 94 | 131 | 46 | 103 | 65 |
| Birmingham | | 37 | 78 | 78 | 98 | 137 | 48 | 108 | 69 |
| Nashville | | 34 | 61 | 61 | 81½ | 106 | 37 | 84 | 53 |
| Memphis | | 31 | 66 | 66 | 83 | 115 | 40 | 100 | 57 |
| Decatur | Cleveland | 38 | 79 | 79 | 99 | 154 | 45 | 108 | 69 |
| Huntsville | | 38 | 79 | 79 | 99 | 154 | 45 | 108 | 69 |
| Sheffield | | 38 | 79 | 79 | 99 | 154 | 45 | 108 | 69 |
| Chattanooga | | 36 | 74 | 74 | 94 | 145 | 42 | 103 | 65 |
| Birmingham | | 44 | 84 | 84 | 106 | 164 | 48 | 116 | 74 |
| Nashville | | 36 | 67 | 67 | 90½ | 131 | 41 | 92 | 59 |
| Memphis | | 38 | 77 | 78 | 97 | 151 | 44 | 107 | 68 |
| Decatur | New Orleans | 24 | 65 | 57 | 82 | 87½ | 40 | 89 | 57 |
| Huntsville | | .. | 68 | 59 | 85 | 90½ | 42 | 91 | 59 |
| Sheffield | | .. | 66 | 58 | 84 | 88½ | 41 | 91 | 58 |
| Chattanooga | | .. | 69 | 61 | 87 | 92½ | 42 | 95 | 61 |
| Birmingham | | .. | 59 | 51 | 74 | 79½ | 36 | 81 | 51 |
| Nashville | | 26 | 73 | 64 | 96½ | 97½ | 45 | 100 | 64 |
| Memphis | | .. | 63 | 55 | 78 | 83½ | 38 | 86 | 55 |
| Decatur | Philadelphia | 45 | 90 | 90 | 112 | 92½ | 55 | 123 | 90 |
| Huntsville | | 45 | 90 | 90 | 112 | 92½ | 55 | 123 | 90 |
| Sheffield | | 45 | 96 | .. | 119 | 92½ | 59 | 131 | .. |
| Chattanooga | | 38 | 82 | 80 | 103 | 92½ | 50 | 113 | .. |
| Birmingham | | 46 | 92 | 89 | 114 | 92½ | 56 | 126 | 89 |
| Nashville | | 43 | 90 | 90 | 116½ | 92½ | 55 | 123 | 90 |
| Memphis | | 45 | 97 | .. | 122 | 98½ | 60 | 134 | .. |

* Sources: New England Freight Agent, Southern Railway, June, 1938; General Eastern Freight Agent, Louisville and Nashville, June, 1938; Agent Miller, Southern Motor Carriers Rate Conference, Atlanta, Georgia, March, 1939.

† Carload minimum weights range from 34,000 pounds to 60,000 pounds; truck volume rates are quoted on minima ranging from 15,000 pounds to 36,000 pounds.

‡ CL, carload; LCL, less than carload.

tered over the Plateau, across the Sequatchie Valley, and by way of the Tennessee River gorge through Walden Ridge.

Within the Region there are such important connecting routes as the Florence-to-Athens highway and the Decatur-Moulton-Russellville-Sheffield circuit. North-south feeder highways to U. S. 72 cross the Region by way of Huntsville and the tri-city center.

The Tennessee River, a former barrier to north-south traffic, now has four important crossings in the Region, namely, a fine highway bridge at Decatur, roadways over Wheeler and Wilson Dams, and a new highway bridge connecting Florence and Sheffield (Fig. 6). All are toll-free crossings.

It is clear that the Region has easy access by highway to all points east, west, north, and south. But it is in no sense a highway center, and this in turn affects the efficiency of highway transportation from and to the Region. The nearest centers are the four cities, Nashville, Chattanooga, Birmingham, and Memphis. They are the termini of important trucking firms, which give these centers some of the superior service already noted in the discussion of rail facilities. Within these termini complete pick-up service is available, and they are the starting points for truck crews and tractors. Established trucking routes radiate in every direction. Highway transportation, however, is more flexible than rail service, and goods do not suffer the yard delays at junction points typical for goods carried by rail. For the Region these features are distinct advantages, since some of its plants are too small to assemble full carloads, or they ship to markets too scattered or too small to require carload lots. Such plants are often able to assemble truck loads, which can be dispatched at any time direct from plant to destination without delays. In 1935 one of the Region's fertilizer plants delivered 70 percent of its output by highway carriers from its loading platform direct to the consumer.

In speed of service trucking is frequently faster than rail L.C.L. service. For example, from Huntsville and the tri-city center to New Orleans truck service is one day faster than rail service. Moreover, the highway is open to all properly registered carriers, so that manufacturers may be their own carriers and may adjust their transport schedules to meet their particular needs. In 1935 one factory operated its own trucks to markets north of the Ohio River and carried return cargoes of raw rubber. Thus highway carriers can give to many of the Region's plants an independence and flexibility in marketing heretofore available only to large concerns.

Though highway transportation offers door-to-door service, is fast, and is flexible as to schedule, it is not low-cost transportation. Comparison of rates by highway from the Region with those by railway reveals that highway rates are usually equal to or slightly above rail L.C.L. rates. These are set forth in Table 12. No highway rates comparable to the low rail carload rates are regularly available. Large plants, able to assemble straight carloads, can affect substantial shipping economies through railway carriers. In cotton and cotton goods, however, the lack of C.L. ratings gives truck operators, especially contract truckers, an advantage.¹² For the Region this is significant, since cotton textiles rank first among the groups of manufactures represented.

As an offsetting factor to comparatively high rates by highway carriers, shippers enjoy a substantial decrease in packing costs when shipping by truck. Such packing requirements are extremely light and simple by comparison with rail requirements. This makes possible a saving in time and in packing costs. Despite lower packing requirements, loss and damage are kept at a low figure by reliable carriers, and settlement of claims is becoming prompt.¹³

Highway transportation has brought to the Region a degree of independence in the assemblage of raw materials and in the marketing of goods which it lacked as long as it depended solely on railway carriers. Now goods from the Region's smallest plants can be moved promptly and directly to the consumer. From that standpoint the Region has gained more, relatively, from highway carriers than well-established large centers of industry which have long enjoyed superior shipping facilities through railway carriers.

Inland waterway facilities.—In the very near future the Region will be able to use the largest river carriers as a third means of transportation. Via the Tennessee River, it will have access to a far-flung inland waterway system which has an all-year minimum nine-foot channel. This system will include the Ohio from

¹² *Consolidated Freight Classification No. 12*, p. 139.

¹³ Federal Coordinator of Transportation, Section of Transportation Service, *Merchandise Traffic Report*, pp. 7-8.

Pittsburgh to its mouth, the Mississippi from Minneapolis to the Gulf, the Illinois and the Chicago drainage canal from the Mississippi to Chicago and to the ports of the Great Lakes, the inner Gulf Coast route from Corpus Christi on the west to Appalachicola on the east, and the Black Warrior from Mobile to Port Birmingham. Other inland waterways with a six-foot channel will connect with this system.¹⁴

The Tennessee River has never been satisfactory for river carriers. The obstacles have been a channel depth too shallow during low-water seasons for even small river craft, and, at all times of the year, numerous reefs and shoals in stretches of the river upstream from the western Alabama state line. The Tennessee Valley Authority, through the construction of high dams, is rapidly converting the Tennessee River into a series of large elongated lakes. In 1938 it started the construction of Kentucky Dam, twenty-three miles upstream from the mouth of the Tennessee River. The lake which will form behind the dam will be the last necessary link in a chain of reservoirs which will give the Tennessee River a minimum year-round seven to nine-foot channel from its mouth to the Region. Other dams providing the successive levels of navigable waters are Pickwick Landing, Wilson, and Wheeler. With the exception of Wilson, which requires three lockings, single-lift locks take river craft from one reservoir level to the next. Upstream from the Region, reservoirs behind high dams will provide a nine-foot channel to Knoxville, when the main river development program is completed. The reservoirs behind the Guntersville and Hales Bar Dams are able to take river vessels of the largest type to Chattanooga. Above Chattanooga, river development will be completed by 1944, if the Tennessee Valley Authority maintains its construction schedules.¹⁵

With the completion of this program, the Region will have ideal inland navigation facilities. The system of high dams necessitates few lockings. The reservoirs have relatively quiet water for long stretches immediately behind the dams. The time re-

¹⁴ Lilienthal, "Navigation on the Tennessee River," *Southern Economic Journal*, IV (April, 1938), 397-98.

¹⁵ *Ibid.*, p. 397.

quired to move upstream will therefore more nearly correspond to the downstream schedule. The high dams greatly reduce fluctuations in water level at the locks and river terminals during flood stages. The Kentucky reservoir, for example, will have an extreme pool fluctuation of 17 feet, provided the surcharge level is raised to 370 feet above mean sea level. Normal reservoir level will be at elevation 357 and the draw-down level at elevation 353. Only during exceptional flood periods, when the reservoir will be used to its maximum capacity, for the storage of flood waters, will the water reach the surcharge level, and then only for short periods of time.¹⁶

The Tennessee River also has the favorable natural condition of being relatively ice-free. Ice conditions severe enough to interfere with navigation are very rare and, when they do occur, are confined to small areas, most frequently in the vicinity of Knoxville. No record of ice conditions is available for the stretch of river flowing through the Region. At Chattanooga, where winter weather is similar though at times a bit harsher, the Tennessee River has been closed to navigation because of ice on only two occasions since 1900, namely for a four-day period during January, 1900, and for a three-day period during January, 1919.¹⁷ At the mouth of the Tennessee River heavy ice existed during the months of January and February, 1918; and for twelve days during February, 1936, dense floating ice, moving down from the upper Ohio River, caused navigators to seek refuge within the mouth of the Tennessee River.¹⁸ The significance of ice-free conditions is minimized by the fact that the northern part of the inland waterway system to which the Tennessee River has access is frozen over during several winter months, thereby restricting interchange via the river between the Region and those areas.

Modern terminal facilities are not available along the Tennessee River. Since terminal facilities can be neither constructed nor

¹⁶ Tennessee Valley Authority, *The Unified Development of the Tennessee River System*, p. 72.

¹⁷ Letter from the War Department, United States Engineer Office, Nashville Tennessee, July 12, 1937.

¹⁸ Letter from the War Department, United States Engineer Office, Louisville Kentucky, Sept. 7, 1937.

operated on the Tennessee River without the approval of the Tennessee Valley Authority,¹⁹ it is probable that principal terminals will be provided in the Region by the Authority. These will very likely embody all the latest advances in terminal facilities devised by science, and their location will be closely coördinated with the rail net and the highway pattern.²⁰

TABLE 13
RAILWAY AND WATERWAY DISTANCES FROM RIVER PORTS
IN THE REGION TO SOME IMPORTANT CITIES
ON THE INLAND WATERWAY SYSTEM *

| FROM: | TO: | RAILWAY MILEAGE | WATERWAY MILEAGE |
|-----------------------|-------------|--------------------|---------------------|
| Decatur Tri-cities | Knoxville | 232.6 | 342 |
| | | 276.7 | 390 |
| Decatur Tri-cities | Pittsburgh | 737.8 | 1,241 |
| | | 746.8 | 1,193 |
| Decatur Tri-cities | Cincinnati | 422.0 | 769 |
| | | 431.0 | 721 |
| Decatur Tri-cities | Chicago | 580.4 | 904 |
| | | 589.4 | 856 |
| Decatur Tri-cities | Minneapolis | 985.3 | 1,228 |
| | | 994.3 | 1,180 |
| Decatur Tri-cities | New Orleans | 500.0 | 1,323 |
| | | 544.1 | 1,275 |

* Sources: Railway mileage from the *Official Guide of Railways and Steam Navigation Lines of the United States*. Waterway mileage from Lillenthal, "Navigation on the Tennessee River," p. 398.

Unfortunately for the development of traffic over the inland waterway system, the routes from the Region to important points are, with one exception, extremely circuitous, as the mileage comparison in Table 13 suggests. This circuitry appears to be so great that rail lines in many instances will not be required to make through routes with water carriers. The circuitry rules which ap-

¹⁹ *United States Statutes at Large*, XLIX (Part 1), 1079.

²⁰ Tennessee Valley Authority, *The Unified Development of the Tennessee River System*, pp. 42-44.

ply will be briefly explained and their significance for the Region noted. Traffic via the river will of necessity in many instances originate in or be destined to points off the waterway, thus involving a transfer between land and water. The only advantage of the waterway to such business lies in the low rates. The usual practice in the past has been to establish rates fixed at 80 percent of the charge by rail route for both all-barge and barge-rail transportation. Barge-rail rates are under the jurisdiction of the Interstate Commerce Commission, and it may compel rail carriers to make through rates with water carriers. However, in carrying out this provision the Commission has been guided by circuitry rules, which provide, in general, that (1) no barge-rail route need be established where the water-rail mileage exceeds by more than 40 percent the shortest all-rail route between origin and destination through the point of interchange, nor where the rail distance to the interchange point in barge-rail operation exceeds three-fourths of the most direct rail route from origin to destination; and (2) no rail-barge-rail route need be established where the circuitry exceeds $33\frac{1}{3}$ percent, nor where the combination of rail distances in rail-barge-rail route exceeds two-thirds of the direct rail route.²¹ Thus interchange with barge routes by the Louisville and Nashville at Decatur will very likely not be required for goods moving northward to Cincinnati and points to the northeast. For goods moving southward to New Orleans such interchange will certainly not be required.

For all-barge hauls the above rules, of course, do not apply. In the Region the tri-city and Decatur centers are situated on the Tennessee River and all other centers are within easy trucking distance of it. This places the Region's industries in contact, via river carriers, with approximately 22,000,000 persons living within twenty-five miles of the banks of the inland waterway system.²²

It is true, however, that many of the Region's present industries manufacture commodities which, in any event, will not be attracted by river service. They are goods of comparatively high

²¹ *The Freight Traffic Red Book*, pp. 578, 584-85.

²² *The New York Times*, April 15, 1938.

value and in their shipment frequency of service and speed in transit are important factors. They are sent out in small lots to a scattered market, much of it away from navigable rivers. River service cannot function for such industries. Future industries, requiring bulky raw materials and manufacturing items of bulk, can, however, locate to great advantage on plant sites adjacent to the Tennessee River, provided the raw materials and markets are in proper alignment with the inland waterway system. The pulp-and-paper industry has already been discussed from such a point of view. Other commodities which might be moved advantageously by river carriers are the products of the lumber industry, those of the brick and tile works, raw materials for the electrometallurgical and electrochemical industries, and the products of cement works. Some of these industries may operate their own carriers. Others can avail themselves of the service of common carriers. The Inland Waterway Corporation will very probably be extended to the Tennessee River, to function in that capacity.

In examining the future importance of river transportation service to the Region's industries, it should be noted finally that the Tennessee River Valley has never been an important carrier of commerce. It offers for the most part easy grades and a favorable valley floor, but railway and highway routes have not preëmpted it. These means of transportation use the valley in stretches, only to climb out again. One reason for this is clearly the extreme circuitry of the Tennessee River, when viewed from its upstream areas to its mouth. A second factor appears to be the lack of a large volume of goods for mutually advantageous exchange between the various stretches of the river valley, or between more distant areas linked by the river. The valley of the Tennessee River, taken as a whole, is at present not even a minor transportation corridor, and it does not appear likely that even fine navigation facilities can greatly alter this position. The Region, therefore, cannot safely look forward to a great through movement of commodities by river, from which its centers of industry might benefit incidentally. Whatever commodities are assembled for processing in the Region must be attracted by the

Region's own inherent advantages. That some of these commodities can be carried by river craft at substantial savings seems well established.

Summary.—The Region's location in a scattered market of low per-capita buying power and its position in the commercial backwash of such important adjacent centers as Nashville, Birmingham, Chattanooga, and Memphis are factors that have placed it at a marketing disadvantage. But advancing technology is providing the means for an ever-increasing flexibility in the handling and movement of goods. These advances now enable industrial concerns in the Region to receive and send goods to distant points without delays at near-by traffic junctions. With further advances, the Region may look forward to continued comparative improvement in its marketing position.

FACTORY SITES AND THE RESIDENCE SPACE

The Region has abundant suitable areas for factory sites and for residence space to accommodate the industrial population. Such areas are still available within and immediately surrounding the present centers of industry. Away from the centers are other areas, topographically favorable, and accessible to developed routes of transportation. The factor of congestion and all the problems that spring from it, therefore, need not plague the Region.

The areal extent, distribution, and availability of factory sites. Manufacturing is an activity which is areally concentrated. In the Region the centers of industry occupy no more than 0.7 percent of the area.²³ The factory sites, in turn, occupy only a tiny fraction of the area of the industrial centers. Greater Huntsville illustrates this fact. In this center of industry the immediate factory grounds of industrial plants occupy 1.9 percent of the center's area. The immediate factory grounds comprise the area occupied by the factory buildings, warehouses, power house or power station, railroad sidings, and, as a rule, a fringe of parked grounds surrounding the factory unit. Though the factory sites

²³ Computed from planimetric measurements, United States Geological Survey, Planimetric Maps: Northern Alabama. Washington.

are only points in the Region's areal pattern of industry, they are points to which and from which great quantities of materials move and at which thousands of workers regularly congregate. It would seem that such sites of intensive economic activity would be located on the basis of detailed economic-geographic considerations, but for the Region this has not been the case. Promotional interests have exerted the greatest influence. Other factors, operative to some extent in special instances, were water supply, transport facilities, and the availability of residence space for the factory population.

All of the centers of industry exhibit a distributional pattern of plant sites which dates back to the period of industrial promotions. The promotion companies of the time were first of all dealers in land. Land that could be cheaply acquired was sought for industrial sites and residence space. But large tracts of such land were not available within the limits of the existing cities. Entire farms which lay adjacent to the present centers of industry were therefore bought up. The industrial sites follow this pattern of land acquisition. The present city of Sheffield lies entirely on land acquired in that fashion, much of it at \$12 per acre. In Greater Huntsville the large plants are all located on land which lies beyond the city limits and which was farm land at the time of purchase. In Decatur land fronting the Tennessee River, to the southeast of the old city, was laid out as a factory belt; a succession of plants has occupied various sites on this strip of land, and large factories occupy parts of it at present. More recent promotion enterprises have also contributed to plant location. A small plant to the east of Tuscumbia now occupies a building and site formerly used by realtors booming Muscle Shoals City. Though the selection of factory sites has been guided by the location of land acquired in promotion schemes, it does not appear that such selection has been a factor detrimental to industrial growth. Railroad sidings had to be provided in any event, and the railroads, anxious to increase their traffic, adopted a liberal policy in providing any desired facilities.

The construction of new factories during the decade 1920-30

reveals no significant trends away from the pattern of plant sites as established during the period of industrial promotions. A few of the factories recently located have selected sites without regard to railroad facilities. But all remain within or immediately adjacent to the centers of industry. The factories of the Region are not hemmed in by other structures. Some are simply set in the open country and are surrounded by fields of cotton and corn. Others are hidden from view by large shade trees, which are arranged in parklike fashion and which may occupy several acres of land surrounding the factory buildings. A few factories, flanked by railroad sidings, present a drab appearance, but even these sites cannot be characterized as crowded.

Away from the centers of industry are extensive and suitable plant-site areas which remain unappropriated. An example is the rural area between Wheeler Dam and Town Creek. This area is bounded on the south by the Southern Railway and by State Highway 20. The roadway across Wheeler Dam gives easy access to U. S. Highway 72. The industrial population could have its home space on either side of the river. The area is well located for the transportation of goods by the Tennessee River. Large power-consuming industries, with demand for secondary power, could purchase power directly from the switchboard of the Wheeler Dam power station. This illustrates the fact that industry could increase many-fold and still have abundant and suitable sites for factories.

The distribution of the home space.—In the immediate past the home space of the factory working force was confined to the residential areas of the existing cities or to mill villages erected adjacent to the factory sites. For the past two decades this home space has been rapidly dispersing. The rural area surrounding the centers of industry, within a radius of ten and in some instances as much as twenty miles, must now be considered as potential residence space.

The proportion of the factory personnel residing in the rural area cannot be stated quantitatively. Some plants reported less than 5 percent with homes in the rural area. Others reported over 15 percent. Those who have their homes in rural areas are, as a

rule, young men and women who continue to live with their families after they have obtained factory employment.

The primary factor responsible for the dispersion of the residence space is the better means of transportation brought about by the all-weather highway and the automobile and bus. This factor is obviously nation-wide in scope, but the Region is favored with an industrial pattern and with climatic and topographic conditions which make such dispersion particularly easy. The centers of industry are still small population units, comparatively speaking, and they lie at distances of from thirty to forty miles from one another. The flow of workers between the dispersed home space and the factory sites, therefore, does not present acute problems of traffic congestion, and land adjacent to the factory is abundant enough to afford parking space. Since the centers of industry are situated on both sides of the Tennessee River, much of the gently rolling land flanking the river is potential residence space. The terrain of these lands favors low-cost, all-weather highways. The mild winters, with snow blockades unknown, permit year-round travel by bus or automobile.

The significance of the dispersed home space for the Region's industries cannot be presented with any degree of exactness. Few generalizations are warranted, because the movement is too recent and no general pattern has as yet evolved. To date it consists of little more than the simple economic fact that young men and women find it cheaper to live with other members of the family in their rural homes than to live within the centers of industry.

One evident change, in part attributable to the dispersed home space, is the decline in mill-village construction. With one exception, all factories erected during the past fifteen years found it unnecessary to provide mill villages, and factories that were offered for sale were relieved of the mill-village appendage before they found buyers. Plant superintendents in charge of factories with mill villages were emphatic in their statements that the mill village had outlived its usefulness, for a labor supply housed immediately outside the factory gates was no longer a necessity and certainly no economic advantage to the factory owners. The

mill villages have not brought in, in rent, the amount required for maintenance, depreciation, and taxes.

The decentralized home space also affords a greater degree of comfort for the factory population. To live away from the factory, beyond the sound of the factory whistle, is in itself an advantage, since it introduces an element of change. A dispersed home space also affords opportunity for gardening and part-time farming. Short working hours have recently encouraged such a program. Such enterprises add to and diversify the local food supply and provide variety of activity. Variety of work is one check against possible monotony of factory work.

A city outside the Region is selected to illustrate a development in this direction. Alcoa, Tennessee, for some years sponsored an industrial gardening program. Because space in side and backyard gardens was inadequate, vacant land surrounding the residential areas and factory grounds was laid out in sizes of one-eighth, one-fourth, three-fourths, and one-acre plots. During 1934, 140 acres were devoted to gardening, in which 354 families participated,²⁴ canning more than 60,000 quarts of vegetables and fruits. The gardening program was introduced as one measure to alleviate the distress caused by reduced income due to curtailed hours and unemployment. But it proved highly successful and was engaged in with enthusiasm, despite the great distance of garden plots from some of the active members' homes. In the spreading home space of the Region, the garden land can be owned by the cultivator, as a part of the land of the home site.

To summarize, the present trend is toward a dispersion of the residence space for the industrial population. If technology continues to develop the various means which have facilitated this dispersion movement, the Region will be in a position to take full advantage of such a trend. It has open and mild winters, a topography which simplifies road construction, good aquifers from which domestic water can be secured, and a long humid growing season. It is an ideal area for a closer union of industry and agriculture.

²⁴ The 1930 population of Alcoa was 5,200.

Chapter VI

THE HUMAN FACTOR



INDUSTRY's objective should be to promote general well-being. In the promotion of such well-being the people of the Region stand in a dual position. It is obviously they who should receive a liberal share of the higher plane of living which industrial development is designed to provide. But they are, first of all, molders of the Region's industrial progress and in that capacity must aim to develop an industrial structure in harmony with the national economy and with the Region's natural equipment. The purpose of this chapter is to analyze the Region's population in its relation to industry from such a dual standpoint. Consideration will first be given to methods employed by the Region's communities to foster industrial growth. In the second and third parts attention will be given to the personnel active in the management and operation of the Region's industries.

COMMUNITY AIDS TO INDUSTRY

Industry in the Region has strong community support, and, as has been shown at an earlier point, the need for more industry is the theme song of the most articulate segment of the Region's population. The desire for more industry has frequently led citizens of the centers of industry to bid for additional manufactures. They have in certain instances provided factory buildings or parts thereof, they have given deeds to factory sites without cost, they have supplied free water, and they have sold factory sites and buildings at great financial sacrifice in order to secure a new

occupant after the initial industry had failed. City and county tax exemptions have been granted to incoming industry for periods of five or ten years.

The practice of granting special inducements is widespread;¹ hence it should not be thought of as a distinguishing characteristic of the Region. But the distribution of industry within the Region and the position of the Region as an industrial area were both influenced by this factor. Even as early as 1891, Huntsville and Athens bid for the same textile plant.² A concern which located in one of the minor centers of industry in 1928 sought bids in three cities of the Region and in other centers of Alabama before selecting its location. The community which was successful in securing the plant financed the factory building through a \$150,000 bond issue and granted five years of city and county tax exemption.

It is not within the scope of this study to present a complete history and quantitative analysis of special inducements which communities in the Region have actually offered factories from time to time. It is a subject which factory superintendents and factory owners discuss with some reluctance. The data used in the following statement were secured entirely from them and merely indicate that special inducements were frequently held out to attract industry. At least three manufacturing concerns were furnished with buildings or with cash grants to cover the cost of parts of the buildings, five were granted city or city and county tax exemption for a period of five years, three received free water for unascertained periods, and four concerns secured a form of indirect aid by purchasing abandoned plants from the community at receivership prices. It is certain, however, that this statement is incomplete, for some of the concerns which received special inducements from the community have passed from the scene and no clear account of the extent of local aid obtained by them is available. Among the present occupants were some who did not make clear the nature of all the bonuses they

¹ Chamber of Commerce of the United States, Department of Manufactures, *Special Inducements to Industries*, pp. 6-7.

² Chapman, "Huntsville Life in the Gay Nineties," *Huntsville Times*, July 8, 1934.

secured, while others cited only one of several inducements they had accepted.

The provision of factory buildings and plant sites by the community for some new industry is a form of local "capital aid."³ In the Region the necessary capital has been raised through city bond issues, through outright community subscription, and through the sale of stock by local organizations to local people. Community patriotism has been invoked to stimulate the sale of stocks. But genuine preference for local investments has also been an important factor in making funds available for capital aid. In these ways local capital participated in bringing many large concerns into the Region, which in all probability would have located elsewhere had reliance been placed solely on outside capital for the development of such enterprise.

Tax exemptions, free water, and lower rents are typical of "operating aids"⁴ which the Region has held out at times as inducements for new industries. Concerns which have brought in new industries have sometimes found it necessary to train labor and to perfect marketing facilities. These aids were designed to keep at a minimum the operating losses of such industries until they reached a normal stage of production.

Capital aid and operating aids, however, are not short cuts to the establishment of diversified centers of industry. They cannot overcome continuing natural disadvantages and, if held out too indiscriminately, they may be accepted by concerns which can or will flourish only as long as the help lasts. Occasional disregard of these dangers has led communities to grant aid to concerns which misrepresented facts or which were poorly suited to the Region. Such concerns rapidly passed from the scene and left the communities to absorb their losses as best they might.

During the decade 1920-30 one concern applied to a community of the Region for capital aid, after it had put up at a county fair an elaborate display booth which purported to exhibit products that had been manufactured with machinery which the concern wished to move into the locality. It was discovered too

³ Chamber of Commerce of the United States, *op. cit.*, p. 16.

⁴ *Ibid.*

late that the exhibited material had actually been purchased from other firms. In the meantime the community had given capital aid to the extent of \$30,000, which was supposedly utilized for the payment of transfer charges on equipment from the North. The machinery was installed in a vacant building which the concern secured rent-free. After eighteen months of desultory operations the plant was closed, and the advance of \$30,000 was entirely lost. The community held the equipment, but this proved to be too nearly obsolete to fulfill the claims made for it by the concern.

The foregoing case illustrates a loss that was negligible when compared with the total wealth of the community. But losses have been incurred that have cut more deeply into the capital reserves of some communities of the Region. During the period 1925-30 two large plants were financed through the sale of stock in the local communities. Large buildings were erected on spacious plant sites. Despite modern equipment, the concerns soon failed. Thereupon the plants were sold at receivership prices. At least one of the plants is operating successfully under its new management, but the communities lost their entire initial investment.

Though special inducements have been extensively used by the communities of the Region to attract industries, the foregoing examples show that such inducements have not always led to industrial progress. The test of fitness of concerns thus attracted has been their survival. Many of the largest enterprises at present in successful operation received upon their location some form of community aid. Perhaps an equal number of bonused plants, most of which operated for only a short time, have disappeared from the Region. They were misfits from the first. These facts suggest that a selective method was not employed in accepting plants that asked for local aid. It appears that the chief cause for such indiscriminate acceptance was the too-eager competitive bidding for concerns by the various communities of the Region. The centers have much in common, as has been repeatedly shown, but competitive bidding has ignored that fact and has greatly magnified the differences. In the eagerness to attract in-

dustry, each center has been tempted to present itself as the utopia for all industry (page 54), while neighboring communities were not always pictured in such a favorable light.

A solution to the problem of competitive bonusing of new industry appears to lie in joint action and in coöperation with the Tennessee Valley Authority. An organization embracing all the centers of industry and established to promote the Region's industrial welfare should be able to visualize more clearly the area's assets and limitations than can be done by each individual center operating for itself. Such an organization would still have to face interregional competition, but the better understanding it should possess of the Region's qualifications would tend to curb overbidding for new industry.

To suggest the establishment of an association sponsoring the regional point of view, in view of the keen rivalries of the past, may seem on first thought somewhat visionary. Present conditions, however, favor such an approach. In the first place, indiscriminate use of inducements is now recognized as an evil by community leaders in the Region. This was pointed out by them over and over again. In the second place, the Region is part of the Tennessee River Valley and as such has the advantage of Tennessee Valley Authority counsel. The Authority is committed to a program which aims at a more wholesome industrial expansion, an expansion which is based squarely on favorable natural factors.⁵ An association established through an intercity or inter-county compact and sponsoring the Region for industries best suited to it, will no doubt have the Authority's support. The amply staffed research organizations of the Authority could act in an advisory capacity. Industries which desired to locate in order to take from the Region and to offer nothing in return could be, in most instances, rejected. Human judgment might err from time to time, but misfit industries could be reduced to a minimum.

Such an organization could, furthermore, lend active support in the elimination of other evils which have hindered genuine

⁵ Lilienthal, "The Future of Industry in the Tennessee Valley Region," *Congressional Record*, LXXVIII (Part 7), 7112.

industrial progress in the past. The practice of vicious real-estate speculation, which has frequently pushed up land values in anticipation of some ultimate industrial development, could be more effectively opposed and perhaps held in check. Through such speculation, more often than not sponsored by firms with offices in remote cities, local human energy and capital, which should have been expended in the development of industries suited to the Region, have been wasted. Any margin of advantage such industrial centers might have had was thereby dissipated.

To summarize, the zeal that local communities have displayed in the promotion of industry is to be encouraged. But the methods employed to attract industry have, in too many cases, led to industrial losses and can profitably be revised. This revision should consist of (1) a substitution of the regional point of view for the village and city point of view which has dominated in the past; and (2) thorough investigation, preliminary to acceptance, of any industrial concerns, rather than indiscriminate acceptance of those which apply.

MANAGERIAL TALENT

Until recently the scarcity of professional managers was a handicap in the operation of the Region's industries. One plant superintendent pointed out that he had assumed the management of a plant in 1903 without any previous experience in factory operation. In fact, he had "never before been inside a factory." He had been serving as bank teller in one of the local banks prior to the assumption of his duties as manager. The mill he undertook to manage had been established in 1901 and had operated for two years under local management. But it had operated at severe losses and was at the point of falling into receivership hands at the close of the year 1903. The prosperity of the years 1904 to 1906 inclusive, combined with day-and-night application to the duties of management, enabled him to build up the reserves of his plant to a point where it was able to weather the panic of 1907. He emphasized the fact that the problems which perplexed him in his first years would have been routine matters to one experienced in industrial management.

The scarcity of trained managers during the Region's initial period of industrial growth was also emphasized by a veteran manufacturer of Shelbyville, Tennessee,⁶ who assumed his first managership in a small plant about 1890. By 1910 he had on his books the names of sixty-five individuals who had secured basic training in his plants and had then gone out to establish plants of their own or to assume managerial positions. Such an order of change, of course, is typical everywhere, but it was the rapidity of change here that emphasizes the scarcity of trained management for the many small industries which sprang up at that time. This manufacturer pointed out that his concern had been more important, perhaps, as a training school for industrialists than as a factory turning out a given commodity.

It was inevitable that this early scarcity of managers should leave its imprint on industry in the Region. From the period of industrial promotions (1880-1900), some of the Region's largest industrial plants have been designed and built by industrial engineering firms of national repute. Such plants were so arranged as to incorporate the latest advances in industrial technique. They were also staffed by managers who understood how such plants should function. On the other hand, small plants, with local limited ownership or individual ownership, could not or saw no need to avail themselves of the services of industrial designers. In some of these plants faulty design and subsequent additions resulted in a cumbersome arrangement and inefficient flow of materials. During prosperous years such concerns were able to produce without a loss, but in times of narrowing profit margins they were squeezed out.

A notable change has taken place in recent decades. In the first place, five branch plants have been established in the Region since 1925. With imported managerial talent and with large parent organizations behind them, they stand as models of efficiency. The community attitude toward these branch plants is in general very friendly. Complaints were heard against only one,

⁶ Shelbyville, Tennessee, lies to the immediate north of the Region and began its industrial career shortly after 1880. The experience related here could very well fit any one of the industrial centers of the Region.

and these were directed at the firm's insistence on generous community aids. In the new branch plants wages and working-conditions are certainly as favorable as and in some instances much better than working conditions in many locally owned plants. For example, the workers of the silk hosiery mills, both branch plants, spoke with enthusiasm and pride about their jobs.

In the second place, several new small plants, some individually owned, have won conspicuous success in their operations, and for such success the new type of management must be given at least a liberal share of credit. A case in point is a plant employing an average of sixty workers. The owner and manager, schooled in engineering and business management and firmly grounded in his type of industry through experience gained in large concerns, has operated his plant in the Region since 1931 and has consistently improved his facilities. As manager, he knows what every man and machine is doing, understands fully the details of each process, and can himself perform any manual operation. Close association with his workers has fostered a spirit of mutual understanding, so that each member of the factory personnel participates as though he shared in its ownership and management.

The Region has definitely emerged from the industrial pioneer stage, if viewed from the standpoint of management and equipment. Present industries are in charge of professional managers who do not rely on the trial-and-error method. An operating policy is followed, which, while less spectacular at times, gives more assurance of successful, long-time operation.

LABOR

Labor has been the most important single factor attracting industry to the Region in recent decades. A plant superintendent of one mill employing 500 workers characterized labor as the Region's "basic commodity." It has operated more than any other factor in bringing about, to an ever-greater extent, the shift to textiles, which have displaced those industries in which nearness of raw materials carried equal weight with labor.

Labor's importance as a locating factor has been due to its

cheapness. But cheap labor, in terms of hourly wage rates, is typical of extensive areas of the Deep South. It might, therefore, be held that some minor factors threw the balance in favor of the Region and thereby clinched recent acquisitions of factories. That this was true in certain cases has been pointed out in the first part of this chapter.

The Region, however, does not have cheap labor merely in terms of comparatively low wage rates. From the period of industrial promotions until the present, factories and even whole industries have come and gone, and during that fifty-year period labor has had diversified training and has acquired a genuine feeling for the factory. Much of the Region's labor, therefore, is efficient, and this efficiency, coupled with low hourly wage rates, results in low labor costs. In the remaining pages of this chapter this cheapness will be examined and the important causes that make for this quality will be briefly assessed.

Prevailing wage rates.—Wage data covering the Region's industries are not available.⁷ Hence wage data for the entire state of Alabama are used as indicative of wages in the Region. State data, though not the best for purposes of this study, indicate quite faithfully prevailing wage rates in the Region. This is particularly true for those industries, such as cotton textiles, hosiery, and lumber, which are not strongly represented in Birmingham.

Table 14 presents average hourly earnings for selected states for those groups of industries which are most important in the Region. The states are selected on the basis of their geographic distribution, the aim being to include important representative areas from various sections of the nation for each type of industry. The average hourly earnings of wage earners in each of the four industries were lower in Alabama than any other state, with the exception of Georgia, which recorded lower wages for its foundry workers.

⁷ Field data covering wages and hours of employment cannot generally be used in this study. Even though the main field work was done after the National Recovery Act was declared unconstitutional, wages and hours as fixed by N.R.A. codes were still in effect. Field data covering wages and hours are also too scattered to be representative. Finally, since wage data could not be gathered for other areas, there is no basis for interregional comparisons.

TABLE 14
WAGES PAID IN FOUR INDUSTRIES IN SELECTED STATES, EXPRESSED
AS AVERAGE HOURLY EARNINGS* OF ALL WAGE EARNERS *

| STATE | COTTON TEXTILES 1930 | HOSIERY 1930 | LUMBER 1930 | FOUNDRIES 1931 |
|---------------|----------------------------|-----------------|----------------|-------------------|
| | CENTS | CENTS | CENTS | CENTS |
| Alabama | | | | |
| Male | 27.9 | 33.9 † | 21.8 | 42.3 |
| Female | 21.7 | 19.4 | | |
| Georgia | | | | |
| Male | 28.6 | 36.9 | 21.8 | 40.3 |
| Female | 23.2 | 20.5 | | |
| Virginia | | | | |
| Male | 30.7 | | 25.9 | |
| Female | 24.6 | | | |
| Kentucky | | | | |
| Male | | | 34.1 | 52.1 |
| Massachusetts | | | | |
| Male | 43.1 | 85.2 | | 69.0 |
| Female | 35.3 | 39.2 | | |
| Maine | | | | |
| Male | 37.2 | | 35.2 | 55.8 |
| Female | 30.4 | | | |
| Pennsylvania | | | | |
| Male | | 71.0 ‡ | | 60.6 |
| Female | | 41.3 | | |
| Michigan | | | | |
| Male | | 65.6 | 38.0 | 58.2 |
| Female | | 37.9 | | |
| Washington | | | | |
| Male | | | 54.9 | 69.8 |

* Sources: United States Department of Labor, Bureau of Labor Statistics, Bulletins No. 539, p. 9; No. 591, pp. 9-10; No. 586, p. 6; No. 570, p. 9.

† Alabama and Louisiana combined.

‡ Eastern Pennsylvania.

Table 15 summarizes the average annual wage per wage earner in Alabama and in selected states, for two industries well represented in the Region. The data are in general accord with the data of wage differentials presented in Table 14. The average annual wage in cotton manufactures in Alabama in 1935 was 77 percent of the average annual wage in Massachusetts, and in 1927 it was 66 percent. In stove and range foundries the average

TABLE 15
WAGES PAID IN TWO INDUSTRIES IN SELECTED STATES, EXPRESSED AS
AVERAGE ANNUAL EARNINGS OF ALL WAGE EARNERS *

| STATE | 1935 | 1931 | 1927 |
|---|-------|-------|---------|
| <i>Cotton Manufactures</i> | | | |
| Alabama | \$583 | \$520 | \$642 |
| North Carolina | 598 | 572 | 691 |
| Virginia | 649 | 795 | 838 |
| Maine | 734 | 639 | 959 |
| Massachusetts | 756 | 827 | 969 |
| <i>Stoves and Ranges, Heating Apparatus, and Steam Fittings</i> | | | |
| Alabama | \$729 | \$712 | \$1,083 |
| Kentucky | 959 | 964 | 1,150 |
| Massachusetts | 1,152 | 1,211 | 1,460 |
| Michigan | 1,179 | 1,206 | 1,597 |

* Sources: Calculated from United States Bureau of the Census, *Biennial Census of Manufactures* (1927, 1931, 1935).

annual wage in Alabama in 1935 was 62 percent of the average annual wage in Michigan, and in 1927 it was 68 percent.

Table 16, though it does not deal with wages in industry, is particularly significant since it supplies for the Region data covering unskilled work. The table emphasizes the fact that the wages of unskilled labor in the Region, as measured by entrance rates of pay for certain municipal street work, start at levels which are among the lowest in the nation; and that the lowest average rates for cities of comparable population in such states as Massachu-

brought them along upon the establishment of the plants in the Region. A concern which located in the Region in 1926 induced its artists, designers, and operators of special equipment to accompany it. Another firm, established in 1931, drew from other areas a skeleton force of highly skilled workers to set quality standards for workers drawn from the local population.

According to the testimony of a veteran manufacturer, a notable improvement in the quality of labor has taken place during the last four decades. This he attributed primarily to improved education and to a community change in attitude toward factory work. In the early stages of industrial development, the workers were often illiterate, obstinate, and superstitious. Training such labor was a formidable problem, for poor workmanship was usually blamed on the machine or the organization. This situation is no longer typical. The formerly prevalent idea that factory work was socially degrading has long been waning, and in recent years there have been available for key positions more young men and women, often high-school graduates, who grasped quickly the rudiments of their work and showed a ready adaptability to factory techniques. Such individuals are filling positions demanding special skill and are advancing to administrative posts.

The Region, therefore, is slowly acquiring its own skilled workers, who possess the initiative, inventiveness, and ability to make consistently better products than their fellow workers. But it still has a deficit of such labor. Industries which are attracted to localities primarily by a supply of highly skilled labor, therefore, are not represented in the Region. This will undoubtedly be the situation for some time to come.

The efficiency of labor.—There is no general agreement in the Region concerning labor's efficiency. But the majority of the plant managers who were interviewed held that the output of labor, per unit of time, compared favorably with labor output in many older industrial areas. A knitting mill established in greater Huntsville in 1925 made efficiency comparisons in 1934 and 1935, and found the output per worker to compare favorably with mills in the North. However, a second knitting mill, estab-

lished in 1927 in the tri-city center, where no knitting concern had operated previously, found that the training of labor was a very slow process. The workers still had a long way to go in speed and carefulness of work before they could approach the normal performance of New England textile workers. The plant manager who voiced this conclusion was himself a product of the North and had gained his experience in the management of textile plants in that area. The hosiery mills, on the other hand, had an output, per worker per hour, that compared favorably with plants in the North. One plant manager pointed out that knitting-machine operators in his plant, more often than not, actually exceeded the output of knitting-machine operators in northern plants with which he had made comparisons. A plant manufacturing ironware, established in 1926, had labor which, if constantly urged and carefully supervised, equaled in output the lower levels of labor output in the major iron and steel centers of the North.

These representative views suggest that considerable local differences in the efficiency of labor prevail. Since some of the views of plant managers were based on general observations, variations in the standards of plant managers in measuring efficiency must first of all be allowed for. Secondly, the output of labor from factory to factory varies, because of differences in plant arrangement and plant equipment. This has already been indicated in the second part of this chapter and need not be discussed further. Thirdly, efficiency of labor in the Region also varies, because of differences in the training of labor. Many of the newly established industries have drawn workers who have had previous experience in the type of work expected of them, or who have come from other industries of declining importance in the Region. Workers familiar with factory techniques naturally take quickly to new operations. A few plants recently established, however, have drawn a large percentage of labor which had had no training in industrial work. Such raw recruits do not merely lack dexterity and alacrity; they also find it difficult to adapt themselves to tasks which require constant repetition of a few motions or acts at an even pace. These workers set a slower

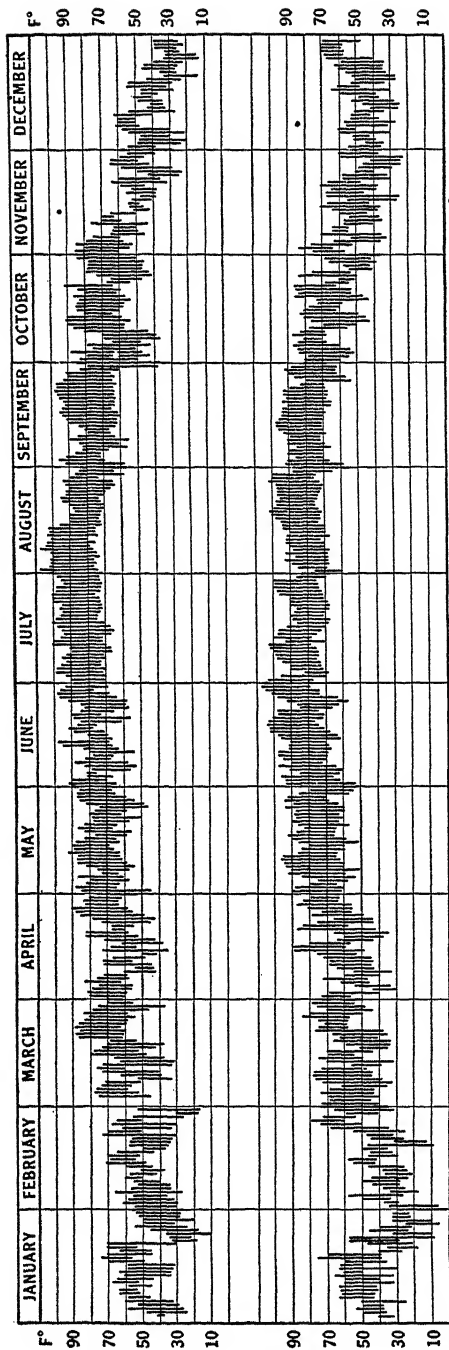


FIGURE 7

DAILY TEMPERATURE RANGE AT DECATUR, 1935 AND 1936

Compiled from United States Department of Agriculture, Weather Bureau, *Climatological Data, Alabama Section*, Vols. XLI and XLII (1935, 1936).

and more irregular tempo and the entire factory production pace must be geared accordingly.

There remains for consideration the vitality of the Region's labor, as a factor affecting its efficiency. The major forces which bear on human vitality include weather and climate, disease, and the mode of living. These will be considered in the order named.

From the standpoint of weather and climate in relation to vitality, the Region appears to have no greater deficiencies than the great industrial centers of the North. Figure 7 indicates that the Region has a day-to-day and week-to-week temperature variability which is considered an essential feature of stimulating weather. Similarly frequent changes in the state of the sky from clear, through to cloudy, back to clear, and similar variability in wind velocity and wind direction assure regular changes in weather which, though not as violent as weather changes in northern industrial areas, are almost as frequent.

The daily level of temperature, in combination with relative humidity and air movement, is the most critical element of weather affecting man's vitality, since it determines the rate of body heat loss under natural conditions. Figure 7 indicates that temperatures in the Region, from late October to early April, frequently dip to a minimum which necessitates warm clothing and indoor heating to check excessive body heat loss. The periods with temperatures much below the comfort range of from 50° to 70° F., however, are neither long nor severe, so that outdoor, daytime atmospheric conditions which are close to the optimum often prevail.

During the period from late June to early September, minimum daily temperatures usually remain above 70° F., and maximum temperatures between 90° and 100° F. are typical (Fig. 7). Relative humidity, during the four warmest months, as suggested for the Region by humidity records of the Birmingham station in 1935 and 1936, remains comparatively high, with average readings of 81, 54, and 64 at 7 A.M., 12 M., and 7 P.M., respectively.⁸ During this warm period body heat loss is retarded.

⁸ United States Department of Agriculture, Weather Bureau, *Climatological Data, Alabama Section*, Vols. XLI and XLII, Nos. 6-9 (1935, 1936).

Moreover, the uniformity of temperature levels adds a monotony to weather conditions which contrasts sharply with the winter, spring, and fall seasons. It may very well be that the hot summer period causes minor illnesses among the factory personnel, produces a general feeling of inertia, and results in lowered efficiency, but no evidence from the Region is available to prove this point.

Few factories and still fewer homes are equipped to counteract the high sensible temperatures of July and August. This is particularly true of the housing facilities of factory workers. Some of the houses are closely spaced, ceilings are low, and the upper half of windows is sometimes fixed in place so that air movement through the rooms is inadequate. Under these conditions hot air accumulates during the day under the ceilings and roof, and in the evening this is radiated throughout the lower portions of the house and requires a large part of the night for dissipation. Some homes of the Region have in recent years installed attic fans, which draw out the hot air and cause the cool night air to flow in at lower open windows. Such fans are remarkably efficient in lowering indoor sensible temperatures, but the cost of installation, which begins at \$75,⁹ is more than the income of the average factory worker permits. The period of excessive heat, however, is brief and now and then it may be interrupted by short periods during which the temperature falls to 60° F. (Fig. 7). The moderately cold winters and the mild weather conditions of spring and fall prevail between nine and ten months of the year.

All plant managers who had come to the Region from northern industrial centers held that the weather, when considered in its varying moods over the four seasons, was no more a factor reducing the worker's vitality than the weather of industrial centers of the North.¹⁰ The daily facts of temperature, relative humidity,

⁹ "Air Conditioning," *House and Garden*, LXVIII (Aug., 1935), 61.

¹⁰ The plant managers of the two silk hosiery mills held that the weather was actually superior for their particular needs. They gave the following reasons: (1) because of the open position of their plants, the summers were as agreeable as the summers in the more crowded industrial centers of the North; (2) the winters were far more pleasant, and their workers had fewer winter illnesses; (3) both plants were air-conditioned and it was their opinion that the air-conditioning equipment functioned better under the somewhat more stable weather conditions of the Region.

and weather changes in the Region are such that this opinion appears to be well founded.

Among the diseases prevalent in the Region which sap human vitality because of their lingering influence, the most significant appear to be malaria and hookworm disease. The average annual morbidity rate of malaria for the period from 1927 to 1936 inclusive was 2.6 per 1,000 of population. Table 17 indicates that the rate varies from county to county and suggests that the counties predominantly rural have a somewhat higher incidence than the average. These data, however, are not wholly satisfactory, since the reporting of malaria cases is not complete.

TABLE 17
MALARIA INCIDENCE AND HOOKWORM INFESTATION,
BY COUNTY IN THE REGION *

| COUNTY | MALARIA | | HOOKWORM | | |
|------------|--|---|---|--------------------------------------|--|
| | <i>Annual Average Cases, 1927-36 Inclusive</i> | <i>Morbidity Rate per 1,000</i> | <i>Number of Individuals Examined</i> | <i>Number Found Positive</i> | <i>Percentage Found Positive</i> |
| Colbert | 94.2 | 3.2 | 2,986 | 155 | 5.2 |
| Franklin | 126.9 | 5.0 | 3,682 | 396 | 10.7 |
| Lauderdale | 48.5 | 1.2 | 1,856 | 29 | 1.6 |
| Lawrence | 194.9 | 7.2 | 3,116 | 117 | 3.4 |
| Limestone | 106.0 | 2.9 | 1,250 | 71 | 5.8 |
| Madison | 64.0 | 1.0 | 4,384 | 75 | 1.5 |
| Morgan | 62.8 | 1.4 | 4,525 | 220 | 4.9 |
| Region | 697.3 | 2.6 | 21,799 | 1,063 | 4.8 |

* Sources: Data on malaria from Annual Reports of the State Board of Health, Alabama, 1927-36. Data on hookworm infestation from the Southern Medical Association, furnished by Dr. W. H. Y. Smith, Assistant Director, Bureau of Preventive Diseases, Department of Public Health, State of Alabama (October 31, 1938).

In the fall of 1934 the Health Section of the Tennessee Valley Authority, in coöperation with the Alabama State Department of Public Health, conducted a malaria survey in the Wheeler Reservoir area. This survey was made to determine malaria prevalence under preimpoundage conditions. Blood smears were taken from the members of every fifth family living within one mile (approximate mosquito-flight range) of the future shore line of the

reservoir. The percentage of positive blood smears among the rural population, as indicated by the fifth-family survey, varied among six counties from 19.3 percent to 60.3 percent, with an average of 27.1 percent. The year 1934 was one of high malaria endemicity. The Health Section of the Authority believes that these rates are much higher than average rates for the entire six counties, since there are more natural breeding places in the river bottoms for the malaria-carrying mosquito than in the higher sections of the counties.¹¹

The Department of Health of the state of Alabama has long been actively engaged in combating malaria by elimination of mosquito breeding areas through drainage projects and by promoting the screening of houses. The recent river impoundings present new problems of control. That the quiet marginal waters of such impoundings may be breeding grounds for the malaria-carrying mosquito has been observed in the Southern Piedmont area, where extensive malaria epidemics have been experienced about such reservoirs.¹² In order to prevent such epidemics in the Region, measures have been taken by the Tennessee Valley Authority to eliminate the mosquito breeding places. This is done through careful control of the reservoirs. The high watermark is kept free from debris, depressions on the margins of the reservoirs are drained, and during the breeding season the pool level is alternately raised and lowered by several feet. Small motor boats are employed to spray an oil solution over the shore lines, and specially equipped airplanes dust Paris green over the same area. Increasingly better control of water-level fluctuations has allowed a great reduction in oil spray and Paris-green dusting. This change to increasing dependence on water-level fluctuations for the elimination of mosquito breeding places has proved highly successful and has been more economical.¹³

A true picture of hookworm incidence in the Region by county

¹¹ Letter from W. G. Stromquist, Acting Director of Health, Tennessee Valley Authority, Dec. 13, 1938.

¹² McKinley, "A Geography of Disease—A Preliminary Survey of the Incidence and Distribution of Tropical and Certain Other Diseases," Supplement to *The American Journal of Tropical Medicine*, XV (Sept., 1935), 378.

¹³ Tennessee Valley Authority, *Annual Report*, June 30, 1938, pp. 79-82.

has recently been made available. A total of 21,799 individuals was examined and 4.8 percent gave a positive reaction (Table 17). Since hookworm has commonly been found to be most prevalent among the rural population, it is quite likely that factory workers, taken alone, would show a lower incidence, especially those who had resided in the centers of industry for some time.

To summarize, no direct data are available which show the importance of disease in sapping the vitality of workers. The data presented for the Region as a whole suggest that it is of negligible importance. It is also significant that none of the factory managers stressed disease, in answer to questions covering the health and vitality of workers. Some of the firms have well-established medical facilities and engage company doctors and full-time nurses. Such concerns find that hookworm infestation and malaria have had very little effect on the efficiency of their employees.

It was pointed out earlier that one plant manager had emphasized diet deficiency as the most important cause reducing the normal vigor of the workers in his plant. Data concerning adequacy of diet are not available for the Region, so that the importance of this factor cannot be further estimated.

Labor costs.—The foregoing survey of labor's efficiency does not suggest any condition inherent in the Region that reduces significantly the worker's vitality. Whatever deficiencies plant managers have noted in the working capacity of the Region's labor appear to be due to lack of training in factory work. Difference in training is also the cause of differences in output rates from factory to factory. But the efficiency of most of the Region's labor has certainly not been low enough to result in high labor costs. One firm had in 1934 and early 1935 a labor cost, per unit of product, which was 20 percent lower than the labor cost for a comparable unit in the firm's plant north of the Ohio River. Several years prior to 1934 the differential had been 50 percent.

Labor costs have been low, low enough to make cheap labor the strongest magnet attracting industry to the Region during recent decades. Out of ten new plants established in the Region since 1920, seven are textile factories. Out of these seven, four

manufacture knit goods. That labor is an important cost factor in these industries can be shown by calculating the importance of wages in the total value of the products. For Alabama, in 1935, wages equaled 21.9 percent of the value of products in cotton manufactures, and 29.3 percent of the value of products in knit goods.¹⁴ Other factors have also favored textiles, as has been shown at various points, but the outstanding advantage has been the low-cost labor. At least one of the three non-textile firms to locate in the Region since 1925 also gave much weight to the favorable labor situation. This firm manufactures iron products. High wages and repeated labor trouble at Cicero, Illinois, where part of the manufacturing process was conducted, induced this company to seek a new location. The Region offered, among other attractions, cheap white labor and cheaper Negro labor suitable for the heavy work required in the iron foundry.

The relation of labor abundance and the cost of living to cheapness of labor.—One factor operating to insure cheapness of labor has been its abundant supply, from the time greater industrialization became an objective in the Region until the present. From 1860 to 1880 the general economy of the Region actually declined. The shrinkage in industry has already been presented (Fig. 3). Agriculture, as measured by the acreage of farm land in an improved state, dropped from 833,000 acres to 830,000 acres. The forest-product industry had not yet gotten under way and mining was of negligible importance. On the other hand, population increased rapidly during this period. The work available in the declined economy had to be divided among a population that had increased, during the twenty-year interval, from 103,114 to 143,388 persons. The largest increase occurred in the native white group (Fig. 8), the group which has been preferred as labor in the majority of industries in the Region. Abundant labor, therefore, was available for factory employment at the beginning of industrial promotions.

Between 1880 and 1930 population increased 88 percent. Only a small proportion of this increasing population found oppor-

¹⁴ United States Bureau of the Census, *Biennial Census of Manufactures: 1935*, pp. 262, 335.

tunity for livelihood in agriculture and the extractive industries. Agriculture was particularly incapable of absorbing large numbers, when viewed in proportion to those already engaged in that occupation. One measure suggesting this is that of the acreage of improved land from decade to decade (Fig. 8). The slow rate at which acreage increased, coupled with the fact that no agricultural intensification occurred, resulted in comparatively

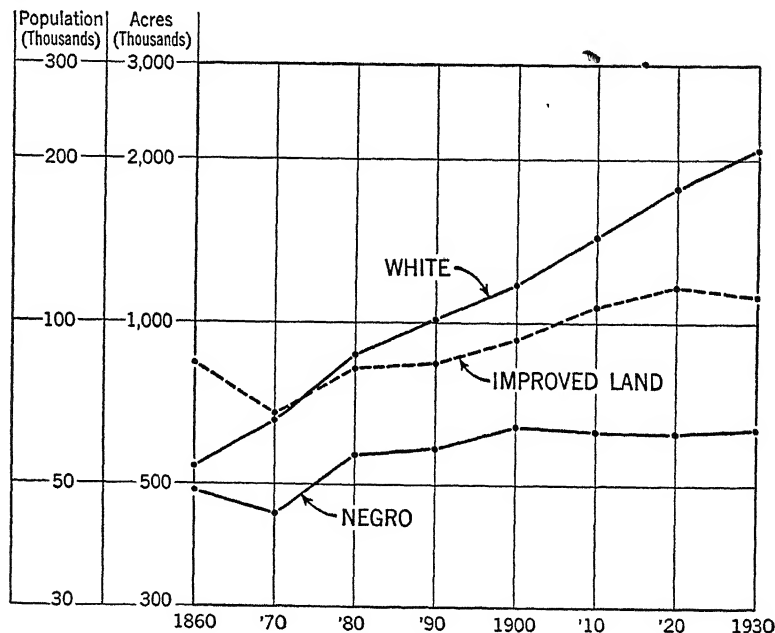


FIGURE 8

RATE OF CHANGE BY DECADE IN WHITE AND NEGRO POPULATION AND IN IMPROVED LAND IN THE REGION

Compiled from the United States Bureau of the Census, Censuses of Population and Agriculture for the decades indicated.

few new opportunities. This was true for the fertile lowlands as well as for the rugged and inaccessible lands.

The rugged areas, with a meager subsistence agriculture prior to the construction of a better road net, were early overpopulated. Thereafter these areas added their regular quotas to the number who sought opportunities in nonagricultural occupations. The

agriculture in the lowlands, which recovered from the effects of the Civil War during the decade 1870-80, was the old cotton economy, manned by tenants instead of slaves. That system of land use offered few opportunities. No diversified farming was developed, because many of the tenants lacked the background for more intensive land use, and landowners did not encourage it. Hence new opportunities in agriculture were not merely few in number, but those that were available offered comparatively low returns. Industry, therefore, did not find it necessary to offer more than low cash wages to induce a movement from agriculture, for even a low cash wage exceeded the meager per-capita returns in agriculture.

Data covering several decades are not available to show quantitatively that opportunities in agriculture have been scarce. Such data are available for 1929 and are presented in Table 18. These data do not indicate agricultural income. Their value lies in a com-

TABLE 18
RETURNS FROM AGRICULTURE PER GAINFUL WORKER FOR THE
REGION, THE NATION, AND SELECTED STATES, 1929 *

| | RETURNS IN DOLLARS |
|---------------------|-----------------------|
| Region | 470.50 |
| Massachusetts | 845.81 |
| Michigan | 882.32 |
| New Jersey | 887.17 |
| Indiana | 1,022.99 |
| United States | 870.85 |

* Sources: Calculated from the *Fifteenth Census of the United States: 1930. Agriculture*, Vols. II and III; *Population*, Vol. III. The expenditures for feed, fertilizer, and farm machinery were subtracted from the sum of the gross receipts from the sale of farm products, and the value of products traded and used by farm operators. The remainder was divided by the number of gainful workers in agriculture as of April 1, 1930.

parison of agricultural opportunity in the Region with agricultural opportunity in industrial states of the North. The lower level of opportunity that prevailed in the Region in 1929 is apparent. The Region's slow expansion of agriculture, coupled with the fact that population was increasing rapidly, gives emphasis to the fact that nonagricultural enterprise, of which in-

dustry was one of the leaders, could secure an abundance of labor at low cost.

The rapid growth of population in the Region has, indeed, exceeded the number its economy could absorb under the prevailing system, and a steady exodus to other areas, especially to the North, has long been under way. This migration from the state of Alabama has been traced in a recent study.¹⁵ No data are available prior to the 1920's for an analysis of movements into and out of the Region. The registration in recent years of births and deaths by county, in the state of Alabama, affords a measure by which recent movements may be checked.

The average annual excess of white births over deaths in the Region during the period 1927-30 inclusive was 3,737, and the annual excess of Negro births over deaths was 540.¹⁶ If these annual averages are carried back to represent the annual increase for the decade 1920-30, the Region should have experienced an increase in the white population of 37,370 and an increase in the Negro population of 5,400. During the decade the actual increase was 30,025 in white population and 33 in Negro population. A comparison of the actual increase in population, as calculated from the Census, with the estimated excess of births over deaths, indicates a net emigration of whites equal to 20 percent of the excess of births over deaths and of Negroes equal to 99.4 percent. That similarly large net emigration of Negroes occurred from 1900 to 1920 is certainly suggested by Figure 8. Such net outward movement gives further emphasis to the abundance of labor.

It does not appear likely that employment opportunities in the Region will expand sufficiently in the immediate future to take up the entire annual increment in the Region's population arriving at employment age. The total estimated excess of births over deaths for the decade 1920-30 was 42,700. Although the birth rate in the Region is declining at a comparatively rapid rate,¹⁷ it appears that the excess of births over deaths in this

¹⁵ Thornthwaite, *Internal Migration in the United States*, Plate III.

¹⁶ Calculated from the *Annual Report of the State Board of Health, Alabama*, 1928-29, 1930, 1931, Tables of Births and Deaths by County.

¹⁷ National Resources Committee, Report of the Committee on Population Problems, *The Problems of a Changing Population*, p. 125.

and the next decade will still run between 35,000 and 45,000, because of the larger population and the declining death rate. Consequently, migration to other areas will have to continue for some time, if pressure for available employment is not to prevail, with its accompanying tendency to depress wages. .

Whether or not other areas can offer opportunity to that portion of the Region's population which cannot find employment in its own area will depend in the first place on trends in the national economy. If a rapid and great expansion occurs, the Region's surplus labor will migrate to areas of deficit labor. This migration will be particularly rapid if, as seems likely, the present restricted national immigration remains in force. In former periods of rapid expansion, the areas of deficit labor have been able to tap the great labor reservoirs of other continents. Under restricted national immigration, they will draw almost entirely from areas with lower economic opportunity within the nation, to which the Region belongs for the present.

In the second place, even with no vigorous advance in the national economy, it may very well be that movement from the Region will take place more readily than in the past, so long as other areas afford greater opportunity. The continuing improvement in means of transportation and communication facilitates such movement,¹⁸ though in recent years various states have erected temporary barriers against movement into their areas. It is doubtful, however, whether interstate checks, under our Federal system, can offset the means which provide increasing mobility of population. This greater mobility tends to equalize the ratio of population to opportunities between the Region and other areas. It is not likely, therefore, that abundance of labor in the future will be as important a factor making for cheapness as it has been in the past.

It has frequently been claimed that lower living costs in the Deep South make possible and justify lower wages. Unfortunately no data are available by which living costs in the Region might be checked. Comparative living costs are available for fifty-nine cities, several of which are close to the Region. Table

¹⁸ *Ibid.*, pp. 117-18.

19 presents living costs for twelve cities selected from the fifty-nine, on the bases of their geographic distribution and size by population. The table indicates that Birmingham, Alabama, has

TABLE 19
COSTS OF LIVING PER YEAR, MAINTENANCE LEVEL, FOUR-PERSON
MANUAL WORKER'S FAMILY, IN TWELVE
SELECTED CITIES, MARCH, 1935 *

| CITY | COST OF LIVING (DOLLARS) | PERCENTAGE OF AVERAGE |
|-------------------------|-----------------------------|--------------------------|
| Rochester, N. Y. | 1,287.63 | 104.7 |
| Atlanta, Ga. | 1,268.22 | 103.2 |
| Richmond, Va. | 1,268.06 | 103.2 |
| Omaha, Nebr. | 1,258.26 | 102.4 |
| Denver, Colo. | 1,246.07 | 101.4 |
| Providence, R. I. | 1,245.26 | 101.3 |
| Average 12 cities | 1,229.27 | 100.0 |
| Portland, Ore. | 1,221.72 | 99.4 |
| Memphis, Tenn. | 1,221.40 | 99.4 |
| Indianapolis, Ind. | 1,198.08 | 97.5 |
| Dallas, Texas | 1,188.97 | 96.7 |
| Columbus, Ohio | 1,178.70 | 95.9 |
| Birmingham, Ala. | 1,168.85 | 95.0 |

* Source: Works Progress Administration, Division of Social Research, *Intercity Differences in Cost of Living*, p. 5.

the lowest living costs, and that the difference in living costs between it and the city with the highest costs is substantial. But cities with comparatively high living costs are found in the South as well as in other major sections of the nation, and among the cities with low living costs are several north of the Ohio River. Since the Region's centers of industry are smaller than the cities indicated in the table, it is quite possible that living costs are somewhat lower. But there is no evidence to suggest that they are significantly lower than in many other centers of similar size in other sections of the nation. That they are not, indeed, is indicated by a study of differences in living costs between five southern and five northern cities, which range in population from 10,090 to 18,601. This study found that living costs were 3.1

percent lower in the five southern cities and that the two cities with the highest and the lowest living costs were both in the North.¹⁹ It does not appear, therefore, that living costs in the Region are sufficiently low to explain the low wages indicated at an earlier point.

This relation of living costs to the level of wages raises the problem of the wage earner's well-being under the Region's program of industrialization. It is often true that industrial wages afford a higher level of living than was attainable under the system of agriculture from which many of the workers came. Nevertheless, under existing conditions the wage income of the average wage earner must purchase everything in the way of food, clothing, and shelter, and in addition those things that help to enrich life and to relieve drudgery in the home. But for many of the workers there is no margin above absolute essentials, while part-time employment immediately forces such workers to seek relief.

The Region provides the equipment for a higher real income flowing to the industrial population. This equipment, however, must be more efficiently used. It has been shown at earlier points that improvement in the skill and efficiency of labor, improved industrial techniques and better plant arrangement, and more efficient management have enabled the Region to increase its per-capita output and to improve the quality of its goods. New facilities for power production at lower rates and improved means for the movement of goods are additional changes tending toward higher productivity. Thus per-capita output of industrial goods will continue to rise, and, given an equitable distribution of these goods, more and more of the returns of industry will flow to the whole of the population contributing to their production.

It has been shown that a closer union of industry and agriculture might also afford a higher real income. With the increasing dispersion of the home space, more and more of the industrial population can participate in food production. Factory wages, which are used at present to purchase items which can be pro-

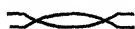
¹⁹ United States Department of Labor, Bureau of Labor Statistics, "Differences in Living Costs in 5 Northern and 5 Southern Cities."

duced locally, can then be devoted more exclusively to the purchase of goods that make possible a higher level of living.

Summary.—Cheap and abundant labor has been, at least in recent decades, a primary factor in the attraction of industry to the Region. In this program of industrial growth, labor too often has been regarded apart from community well-being and as a commodity available at low cost. In the future, closer attention will have to be given to the worker's level of living, if enduring industrial progress is to be assured. That the Region possesses the natural equipment to serve as a basis for such an advance has been shown at various points in this study. In the further development of industry, land should not be considered merely as a source of surplus labor, but should be made into a pleasant home space which affords an improved level of living for the entire population of the Region.

Chapter VII

THE INDUSTRIAL PROSPECTS: A SUMMARY



WHAT FUTURE rôle should the Region play in the nation's industry? To this question the study cannot give a clear-cut quantitative answer, in terms of the number of plants, the size of plants, and the types of plants that might profitably be located here. But the general trend of industry can be discerned by viewing as functional aggregates the locational factors presented in the preceding three chapters. Such a view shows the changing importance of factors in attracting industry, and brings into focus those that will be most significant for the future.

THE CHANGING STRUCTURE OF INDUSTRY

During the first period of industrial consciousness, namely the period of industrial promotions which began during the decade 1880-90, emphasis was placed on the Region's wealth in raw materials and on its favorable location with respect to markets. But advance in technology and the meager and uncertain ore supply of the Region eliminated the pig-iron industry, and excessive cutting of the forests resulted in a shrinkage of the forest-product industry. The seasonably navigable Tennessee River failed to give the Region the hoped-for locational advantages, as the more efficient rail carriers superseded the river carriers.

The decline of industries established during the promotion period coincided with the rise of new groups of industries, which were attracted by and depended for their success on compara-

tively low labor costs, and which were aided by local inducements, lower construction costs, and, in certain cases, by local cotton as raw material. These groups of industries, exemplified by the textiles first notably developed in greater Huntsville, enjoyed a long period of continuing expansion and spread progressively to all the centers of industry until they attained their present position of maximum importance.

Present changes within the nation as a whole and new developments within the Region in particular, however, are operating at unusual speed to change the relative importance of factors attracting industry. Through national legislation covering wages and hours of employment, interregional wage differentials are being subjected to a leveling process. In the textile industry, this leveling process has unquestionably been under way for a long time. A comparison of average hourly earnings in northern and southern cotton textile mills, over the period from 1928 to August, 1938, indicates a narrowing of the difference in wages in the two areas. In 1928 average hourly earnings in cotton textile mills in the South were 69.3 percent and in August, 1938, 82.0 percent, of average hourly earnings in cotton textile mills in the North.¹ In the spring of 1939 the majority of the Textile Industry Committee recommended to the Wage and Hour Division of the United States Department of Labor a minimum wage of \$0.325 an hour in the textile industry, irrespective of mill location, and in October, 1939, this minimum became effective.²

The leveling of interregional wage differentials is also supported by the labor unions. The Textile Workers Union presented a brief to the Textile Industry Committee, in which it advocated a uniform wage minimum of \$0.40 an hour.³ This union has been very active in organizing the textile workers in the South. In the Region it has sole collective bargaining agreements with the three

¹ United States Department of Labor, Bureau of Labor Statistics, *Wages and Hours of Labor in Cotton Goods Manufacturing*, Bulletin No. 663, p. 72.

² *Labor Law Service* (Chicago: Commerce Clearing House, Inc., Loose Leaf Service Division of The Corporation Trust Company) Report No. 78, Oct. 6, 1939, pp. 5002-3.

³ Barkin, "Brief Presented on Behalf of the Textile Workers Organizing Committee in Connection with the Establishment of a Minimum Wage in the Textile Industry," p. 18.

largest textile plants,⁴ and has contracts with a number of the smaller mills. Once the union is well represented, it can organize employee resistance to competitive wage cuts and can promote a more uniform wage scale throughout the textile industry, irrespective of mill location. Many industrialists from the North and a number of textile manufacturers from the South also urged before the Textile Industry Committee a uniform minimum wage, in the hope that wage cutting as a competitive weapon might be eliminated, thus allowing the textile industry to attain some degree of stability.⁵

The forces discussed in the foregoing paragraphs, though operating on a nation-wide basis, are highly significant to the Region. The most important factor attracting industry in recent decades has been the lower cost of labor, made possible by lower wages. As further efforts are made to reduce interregional wage differentials and to bring wages more closely into accord with living costs, cheapness of labor as a factor attracting industry to the Region will tend to be weakened. The growing skill and efficiency of labor in the Region will enable industry to improve the quality of its products and to increase the output per worker. Better management will promote plant efficiency. These factors should offset such increases in labor costs as are due to increases in wage rates, but temporarily they may not keep pace with the increases in wages.

The chief agency modifying the relative importance of several locational factors has been the Tennessee Valley Authority. In a period of one-half decade, the Region has become a gigantic reservoir of hydroelectric power, and this power has been made available at exceptionally low rates. River development is also converting the Tennessee River into an inland waterway, which for the first time in its history will be open for year-round navigation. Encouragement is being given to agricultural diversification, which will aid in the development of new agricultural raw materials for industry. The Authority, in coöperation with the Southern Forest Experiment Station of the United States Forest

⁴ Barkin, *Building a Union of Textile Workers*, pp. 31-32.

⁵ *The New York Times*, June 20 and 21, 1939.

Service, is promoting reforestation, and an increase in forest resources will ultimately result.

These factors, made available or provided in greater abundance, are of primary significance to groups of industries other than those attracted during recent decades. The new industries are exemplified by the phosphate reduction plant of the Authority and the unit erected by the Electro Metallurgical Company. The attempt, in recent years, to secure an alumina reduction plant is a further effort to utilize the low-rate power. The Region also appears to have the necessary qualifications for a pulp-and-paper plant, and there is no local obstacle to the further development of the rubber industry already represented by the inner-tube factory. There is no reason, however, to hold that the manufacture of textiles will decline. The new groups of industries will simply give greater industrial diversity to the Region.

THE FUTURE POSITION OF THE REGION AS AN INDUSTRIAL AREA

Present changes in the structure of industry in the Region and those that appear to be impending do not foreshadow a great industrial boom. All available evidence indicates that the Region will never become a "beehive of industry" in the sense that industry will occupy the area to such a degree that a "Seventy-Five Mile City" will result and that operations will take place under conditions of congestion suggested by these two captions. Such development, in fact, will not even remotely be approached. This is so because the factors which the Region has in abundance and at low cost either are available over extensive areas, or can be made available in many parts of the nation. This is true even as regards power, as was shown in Chapter IV, for the Tennessee River is not endowed with exclusive physical properties which set it apart from all other rivers as regards cost of power development. Hence the Region will always have an abundance of competitors.

The factors which would enable the development of a great industrial area, namely, low cost and quick access to large markets, an unusual combination of large reserves of industrially im-

portant raw materials so situated that they could be most economically processed in the Region, unique skilled labor which refused to move elsewhere, or a combination of some of these factors—these the Region never did have and does not now have.

The inhabitants of the Region may well regard it as an advantage that their communities do not possess the qualifications essential to becoming parts of a gigantic industrial organism. This will enable them to place emphasis on the quality of their living space, rather than on the size of their industry. They can be permanently assured of a comparatively low-cost and pleasant home space.⁶ This feature will become of greater importance as increasing attention is given to orderly community growth and to the social aspects of industrial location. Such an order of development does not imply that low-cost production must be sacrificed, for this home space can accommodate an industrial population of great efficiency. Nor does it suggest that the Region has attained a maximum of population. In fact, the law of increasing returns should operate, for a long time to come, with increase in population. Not until the Region's lowlands present a mosaic of productive fields and woodlands, threaded with transportation routes and power and communication lines, and studded with industrial establishments and centers set in spacious grounds, can the Region be said to have attained maximum efficiency. When this goal has been attained, much more work will be performed annually per unit of its area. In the attainment of this goal the Region has far to go; indeed, it has barely begun.

That such development is not out of harmony with the thinking and policy of some of the nation's great industrial corporations can be demonstrated from current industrial locations and present guiding policy. Alfred P. Sloan, of General Motors, has said that "the soundest policy, both economically and socially, is to distribute the productivity of industry among as many

⁶ The statement that the Region can be assured of a low-cost home space does not mean that existing conditions provide it. Some of the Region's centers of industry have gone through periodic booms; city services and facilities, and residential areas have always been extended at boom prices for land, materials, and labor. Orderly expansion will tend to keep development costs down, and the efficient utilization of the Region will add to the real income without a proportionate increase in costs.

different communities as is practically possible.”⁷ This corporation has in recent years acquired several plants in small cities and has spread certain phases of its manufacturing activity over many parts of the nation. The establishment of village industries by the Ford Motor Company, along the Rouge and Huron Rivers, was cited at an earlier point. Wage scales in these plants are the same as those that prevail at Dearborn. Workers live in the village and surrounding countryside. Much of the heavy production of these corporations will very likely remain in major centers of industry for an indefinite period. But more and more of the manufacture of small parts and accessories is being carried out, in ever-widening zones, away from the major centers of production.

In areas adjacent to the Region, some of the outstanding industrial concerns have located in the open country during the past fifteen years. The rayon mills of Dupont and American Enka are examples. The Dupont factories are located at Old Hickory, Tennessee, and the American Enka mills are situated midway between Asheville and Canton, North Carolina. The phosphate processing plants of the Victor and Monsanto Chemical Companies in south-central Tennessee are located, as might be expected, in the midst of the phosphate reserve areas, away from urban centers. All employees drive back and forth between the plants and the adjacent countryside or near-by villages and cities.

The Region already affords a combination of factors which permits the selection, from an unusually wide area, of factory sites and residence space of uniform quality. This combination consists of favorable topography over the lowlands, uniform power rates throughout the area away from the dams, a highway net which gives access to many parts of the Region, the east-west passage of the Tennessee River which affords extensive river frontage, widely available domestic water, and industrial water supplies over large areas. Industry in harmony with the Region's natural equipment and abreast of the new order of industrial location, must be industry integrated with the remainder of the economy of the community, and must be industry without congestion.

⁷ “Spread Car Operations,” *The New York Times*, May 3, 1936.

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